



SUB-COMMITTEE ON SHIP DESIGN AND  
EQUIPMENT  
43rd session  
Agenda item 18

DE 43/18/Add.2  
26 June 2000  
Original: ENGLISH

## **REPORT TO THE MARITIME SAFETY COMMITTEE**

Attached is Part 1 of annex 2 to the report of the forty-third session of the Sub-Committee (DE 43/18), containing draft MSC circular on Standardized life-saving appliance evaluation and test report forms, together with sections 1, 2, and 3 of the annex thereto. Parts 2 and 3 of annex 2 are attached to documents DE 43/18/Add.3 and DE 43/18/Add.4 respectively.

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**ANNEX 2 (Part 1)**

**DRAFT MSC CIRCULAR**

**STANDARDIZED LIFE-SAVING APPLIANCE EVALUATION  
AND TEST REPORT FORMS**

1 The Maritime Safety Committee, [at its seventy-third session (27 November to 6 December 2000)], approved Standardized life-saving appliance evaluation and test report forms, as set out in the annex.

2 The annexed forms were developed on the basis of the requirements of the International Life-Saving Appliance (LSA) Code and resolution MSC. 81(70) on Revised Recommendation on testing of life-saving appliances, with a view to providing guidance on how to conduct tests, record test data and verify tests. It is intended that, after sufficient experience is gained, the forms could be amalgamated with resolution MSC. 81(70).

3 The use of the annexed forms will be of benefit to Administrations and other parties, such as manufacturers, test facilities, owners and surveyors, and will be of major help in mutually accepting the type approval of appliances approved by other Administrations.

4 Member Governments are invited to bring the annexed forms to the attention of all parties concerned with approving, manufacturing and testing life-saving appliances and encourage them to use the forms.

## ANNEX

### STANDARDIZED LIFE-SAVING APPLIANCE EVALUATION AND TEST REPORT FORMS

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## **1 INTRODUCTION**

### **Reference**

The attached standardized life-saving appliance evaluation and test report forms have been developed on the basis of the requirements of the International Life-Saving Appliance (LSA) Code, the Revised Recommendation on testing of life-saving appliances (resolution MSC.81(70)) and the Recommendation on means of rescue on ro-ro passenger ships (MSC/Circ.810). Mainly, the tests described in MSC.81(70) constitute the Test Procedures and the LSA Code sets the Acceptance Criteria.

### **Status**

The evaluation and test report forms are guidelines on how to conduct tests, record test data and verify tests. These forms are not intended to change the standards given in the LSA Code and resolution MSC.81(70). In the case of inconsistency between the forms and the LSA Code or resolution MSC.81(70), the text of the Code/resolution should prevail over that of the forms.

### **Interim period**

After sufficient experience is gained with the use of the forms over several years, the evaluation and test report forms could be amalgamated with resolution MSC.81(70).

### **Layout**

Each Administration may use electronically distributed evaluation and test report forms as the basis for customisation of layout reflecting the profile of the Approving body, without changing the original contents.

### **Internal References**

The evaluation and test report forms should be stand-alone documents. Thereby all references in the original text have been replaced by either the full-length text or a reference to other relevant evaluation and test report forms. However, in some of the forms, external references are kept for updating purposes.

### **Documentation of tests**

For approval purposes, all detailed records of test data are to be enclosed with the report forms.

### **Verification of tests**

Each test is to be verified passed or failed by the surveyors' initials and date of testing. Each page is to be verified on completion by surveyors' signature and its date of completion.

### **Reporting of type approval**

To facilitate unified reporting procedures, the completed evaluation and test report forms are to be seen as a documented verification of required type approval tests for each type of equipment. When documentation of type approval is required by a third party the verified evaluation and test report forms should constitute the complete documentation of the type approval together with the relevant approval certificates.

## **2 PERSONAL LIFE-SAVING APPLIANCES**

### **2.1 LIFEBUOYS AND ASSOCIATED EQUIPMENT**

#### **2.1.1 LIFEBUOYS**

##### **EVALUATION AND TEST REPORT**

- 2.1.1.1 Submitted drawings, reports and documents
- 2.1.1.2 Quality assurance
- 2.1.1.3 Visual inspection
- 2.1.1.4 Temperature cycling test
- 2.1.1.5 Drop Test
- 2.1.1.6 Test for oil resistance
- 2.1.1.7 Fire Test
- 2.1.1.8 Flotation Test
- 2.1.1.9 Strength Test
- 2.1.1.10 Test for operation with a light and smoke signal

### 2.1.1 LIFEBUOYS

#### EVALUATION AND TEST REPORT

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	



<b>Lifebuoy</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.1.1 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Lifebuoy</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.1.2 <b>Quality Assurance</b>	<b>Regulations: MSC.81(70) 2/1.1.1,2</b>								
<p>Except where all appliances of a particular type are required by chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, or the International Life-Saving Appliance (LSA) Code, to be inspected, representatives of the Administration should make random inspection of manufacturers to ensure that the quality of life-saving appliances and the materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are produced to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="padding-bottom: 10px;">Quality Assurance</td> </tr> <tr> <td style="width: 70%; padding-bottom: 10px;">Standard Used:</td> <td style="text-align: right; padding-bottom: 10px;">Passed/ Failed</td> </tr> <tr> <td style="padding-bottom: 10px;">Quality Assurance Procedure</td> <td style="text-align: right; padding-bottom: 10px;">Passed/ Failed</td> </tr> <tr> <td style="padding-bottom: 10px;">Quality Assurance Manual</td> <td style="text-align: right; padding-bottom: 10px;">Passed/ Failed</td> </tr> </table>	Quality Assurance		Standard Used:	Passed/ Failed	Quality Assurance Procedure	Passed/ Failed	Quality Assurance Manual	Passed/ Failed
Quality Assurance									
Standard Used:	Passed/ Failed								
Quality Assurance Procedure	Passed/ Failed								
Quality Assurance Manual	Passed/ Failed								

<b>Lifebuys</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.1.3 Visual inspection		Regulations: LSA Code 1.2.2
Test Procedure	Acceptance Criteria	Significant Test Data
Visually inspect the lifebuoy. Conduct measurements and verify characteristics as required.	<p>Highly visible colour to assist in detection.</p> <p>Fitted with approved retro-reflective material in compliance with resolution A.658(16).</p> <p>Clearly marked with approval information from the organization that approved it and any operational restrictions.</p>	<p>Colour(s):</p> <p>Passed _____ Failed</p> <p>Quantity: _____ Spacing: _____</p> <p>Passed _____ Failed</p> <p>Any operational restrictions?</p> <p>Passed _____ Failed</p> <p>Comments/Observations</p>

<b>Lifebuoys</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.1.3 Visual inspection	Regulations: LSA Code 2.1.1
Test Procedure	Acceptance Criteria
<p>It should be established by measurement, weighing and inspection that:</p> <p>Measure the inner and outer diameter</p> <p>Weigh the lifebuoy</p> <p>If it is intended to operate the quick-release arrangement provided for a self-activated smoke signal and self-igniting light, conduct the test in 2.1.1.10.</p> <p>Measure the lifebuoy grab-line diameter and length and assess how it is secured</p>	<p>Be constructed of inherently buoyant material; it should not depend upon rushes, cork shavings or granulated cork, any other loose granulated material or any air compartment which depends on inflation for buoyancy.</p> <p>Should have an outer diameter of not more than 800 mm and an inner diameter of not less than 400 mm</p> <p>Not designed for quick release: Should have a mass of not less than 2.5 kg</p> <p>If it is intended to operate the quick-release arrangement provided for the self-activated smoke signals and self-igniting lights, have a mass sufficient to operate the quick-release arrangement or 4 kg whichever is greater.</p> <p>Be fitted with a grab-line not less than 9.5 mm in diameter and not less than four times the outside diameter of the body of the buoy in length.</p> <p>The grab-line should be secured at four equidistant points around the circumference of the buoy to form four equal loops.</p>
	<p>Construction materials :</p> <p>Outer diameter : _____ mm Inner diameter : _____ mm</p> <p>Mass : _____ kg</p> <p>Type / description of quick release arrangement:</p> <p>Does the lifebuoy have sufficient mass to activate the quick-release arrangement for a self-activated smoke signal and self-igniting light ?    Passed/ Failed</p> <p>Weight : _____ kg</p> <p>Grab-line diameter : _____ mm</p> <p>Grab-line length : _____ mm</p> <p>Buoy outer diameter times four: _____ mm Grab-line four times the outer diameter of body? _____    Passed/ Failed</p> <p>Grab-line secured in four equal loops ? _____    Passed/ Failed</p> <p>Comments/Observations</p>

<b>Lifebuoy</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.1.4      Temperature cycling test		Regulations: LSA Code 1.2.2; MSC.81(70) 1/ 1.2			
Test Procedure		Acceptance Criteria		Significant Test Data	
<p>The following test should be carried out on two lifebuoys.</p> <p>Two lifebuoys should be alternately subjected to surrounding temperatures of -30°C and +65°C.</p> <p>These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>    An 8 h cycle at +65°C to be completed in one day</p> <p>    The specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day</p> <p>    An 8 h cycle at -30°C to be completed the next day</p> <p>    The specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.</p>		<p>Not be damaged in stowage throughout the air temperature range - 30°C to + 65°C</p> <p>The lifebuoys should show no sign of loss of rigidity under high temperatures and, after the tests, should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.</p>		Passed _____                      Failed	
				(See following page for test data)	
				Intact after this test?	
				Observations	
				Observations	
				Observations	
				Observations	
				Intact after these tests ?	
				lifebuoy No.1:      Passed/ Failed	
				lifebuoy No.2:      Passed/ Failed	
Comments/Observations					

<b>Lifebuoys</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.1.4 Temperature cycling test – Test data			Regulations: LSA Code I/1.2.2; MSC.81(70) 1/1.2	
	<i>HOT CYCLE</i>		<i>COLD CYCLE</i>	
<b>Cycle 1</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 2</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 3</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 4</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 5</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 6</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 7</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 8</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 9</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
<b>Cycle 10</b>	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

<b>Lifebuys</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.1.5 Drop test		Regulations: LSA Code 2.1.1.6; MSC.81(70) 1 / 1.3	
Test Procedure	Acceptance Criteria	Significant Test Data	
The two lifebuoys should be dropped into the water from the height at which they are intended to be stowed on ships in their lightest seagoing condition, or 30 m, whichever is the greater, without suffering damage.	Be constructed to withstand a drop into the water from the height at which it is stowed above the waterline in the lightest seagoing condition or 30 m, whichever is the greater, without impairing either its operating capability or that of its attached components.	Number of lifebuoys : _____	
		Lifebuoy no. 1 Drop height in water : _____ m Number of drops: _____ m Passed/ Failed	
One lifebuoy should be dropped three times from a height of 2 m on to a concrete floor	One lifebuoy should withstand three drops from a height of 2m on to a concrete floor.	Lifebuoy no. 2 Drop height in water : _____ m Number of drops: _____ m Passed/ Failed	
		Condition lifebuoy no. 1: _____  Passed/ Failed	
		Condition lifebuoy no. 2: _____  Passed/ Failed	
		Comments/Observations	

<b>Lifebuys</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.1.6 Test for oil resistance		Regulations: LSA Code 1.2.2; MSC.81(70) 1/ 1.4
Test Procedure	Acceptance Criteria	Significant Test Data
One of the lifebuys should be immersed horizontally for a period of 24 h under a 100 mm head of diesel oil at normal room temperature.	After this test the lifebuoys should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.	Lifebuoys No. Diesel oil head : _____ mm Duration : _____ hours Signs of damage ? Passed _____ Failed Comments/Observations
2.1.1.7 Fire test		Regulations: LSA Code 2.1.1.5; MSC.81(70) 1/1.5
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The other lifebuoys should be subjected to a fire test. A test pan 30 x 35 x 6 cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to a depth of 1 cm followed by enough petrol to make a minimum total depth of 4 cm..</p> <p>The petrol should then be ignited and allowed to burn freely for 30 s.</p> <p>The lifebuoys should then be moved through flames in an upright, forward, free-hanging position, with the bottom of the lifebuoys 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 s.</p>	The lifebuoys should not sustain burning or continue melting after being removed from the flames.	Lifebuoys No. Dimensions test pan : _____ x _____ x _____ cm Water depth : _____ cm Depth incl. petrol : _____ cm Exposure time : _____ seconds Sustain burning or continue melting after being removed from the flame Passed/ Failed Comments/Observations



<b>Lifebuys</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.1.8      Flotation Test		Regulations: LSA Code 2.1.1.3; MSC.81(70) 1/1.6	
Test Procedure	Acceptance Criteria	Significant Test Data	
The two lifebuoys subjected to the above tests should be floated in fresh water with not less than 14.5 kg of iron suspended from each of them and should remain floating for a period of 24 h.	There should be no breaks, cracks or permanent deformation. The lifebuoys should float throughout the 24 h test period.	Lifebuoy no. 1	Lifebuoy no. 2
		Suspended mass :	kg                      kg
		Float duration :	min                      min
		Intact after this test?	Passed/ Failed
		Float for entire test period?	Passed/ Failed
		Comments/Observations	
2.1.1.9      Strength Test		Regulations: LSA Code 1.2.2; MSC.81(70) 1/1.7	
Test Procedure	Acceptance Criteria	Significant Test Data	
A lifebuoy body should be suspended by a 50 mm wide strap. A similar strap should be passed around the opposite side of the body with a 90 kg mass suspended from it. After 30 min, the lifebuoy body should be examined.	There should be no breaks, cracks or permanent deformation.	Lifebuoy No.	
		Suspended mass : _____ kg	
		Suspension duration : _____ min	
		Passed/Failed	
		Comments/Observations	

<b>Lifebuoys</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.1.10 Test for operation with a light and smoke signal		Regulations: LSA Code 2.1.1.7; MSC.81(70) 1/1.8
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The tests should be carried out if the lifebuoy is intended for quick release with a light and smoke signal.</p> <p>The lifebuoy should be arranged in a manner simulating its installation on a ship for release from the navigating bridge.</p> <p>A lifebuoy light and smoke signal should be attached to the lifebuoy in the manner recommended by the manufacturers.</p>	<p>The lifebuoy should be released and should activate both the light and the smoke signal.</p> <p>The weight of the lifebuoy should be at least 4 kg.</p>	<p>Lifebuoy Bo.</p> <p>Type / description of quick activating arrangement:</p> <p>Type of light and smoke signal:</p> <p>Light activated? Passed/ Failed</p> <p>Smoke activated? Passed/ Failed,</p> <p>Weight of the lifebuoy _____ kg</p> <p>Length of the line connected to the lifebuoy _____m</p> <p>Passed _____ Failed</p> <p>Comments/Observations</p>

## 2.1.2 LIFEBOUY SELF-IGNITING LIGHTS

### EVALUATION AND TEST REPORT

**Remark: If a Lifebuoy Self-Igniting Light is a combined Light/Smoke Signal it should be treated as a sole Lifebuoy Self-Igniting Light.**

- 2.1.2.0 General Information
  - 2.1.2.0.1 General Data and Specifications
  - 2.1.2.0.2 Drawings and Manuals
- 2.1.2.1 Visual Inspection
  - 2.1.2.1.1 Approval Marking
  - 2.1.2.1.2 Expiry Marking
  - 2.1.2.1.3 Additional Markings
  - 2.1.2.1.4 Electrical Short Circuit Protection
  - 2.1.2.1.5 Construction and Materials
- 2.1.2.2 Temperature Cycling Test
- 2.1.2.3 Light Tests
- 2.1.2.4 Chromaticity Test
- 2.1.2.5 Rain Test and Watertightness Test
- 2.1.2.6 Case Resistance Test
- 2.1.2.7 Dome Drop Test
- 2.1.2.8 Floatation Test
- 2.1.2.9 Drop Test
- 2.1.2.10 Fitting Test
- 2.1.2.11 Release and Operation Test
- 2.1.2.12 Vibration Test
- 2.1.2.13 Mould Growth Test
- 2.1.2.14 Corrosion and Seawater Resistance Test
- 2.1.2.15 Solar Radiation Test
- 2.1.2.16 Test for Oil Resistance
- 2.1.2.17 Fire Test

### **2.1.2 LIFEBOUY SELF-IGNITING LIGHTS**

#### **EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.2.0.1 General Data and Specifications		Regulations: LSA Code; MSC.81(70)
General Information	Lifeguard Light Dimensions	Lifeguard Light Weight
TYPE OF SWITCHING  FLASHING LIGHT  STEADY LIGHT		Comments/Observations

<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

**2.1.2.0.2 Submitted drawings, reports and documents**

Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

2.1.2.1 Visual Inspection		Regulations: LSA Code 1.2.2.1/1.2.2.6/1.2.2.9/1.2.2.10/1.2.3	
Test Procedure	Acceptance Criteria	Significant Test Data	
Thirteen lifebuoy self-igniting lights should be examined in detail for the following items :	The lifebuoy self-igniting lights should :	<u>Results:</u>	
Approval marking	- be clearly marked with approval information including the Administration which approved it, and any operational restrictions;	PASS:	FAIL:
	- be marked with a date of expiry;	PASS:	FAIL:
Expiry marking	The Administration should determine the	<u>Results:</u>	
	- period of acceptability, due to deterioration with age. The established life must be justified by the manufacturer	PASS:	FAIL:
Additional markings	Be provided the following information :	<u>Results:</u>	
	precise definition of intended use (e.g. " Lifebuoy self-igniting light");	PASS:	FAIL:
	serial number;	PASS:	FAIL:
	identification of the manufacturer;	PASS:	FAIL:
	where applicable, information on proper battery disposal by the words : "DO NOT INCINERATE / DO NOT RECHARGE / DO NOT TAMPER";	PASS:	FAIL:
Electrical short circuit protection	- be provided with electrical short circuit protection to prevent damage or injury;	<u>Results:</u>	
		PASS:	FAIL:
		Comments/Observations	

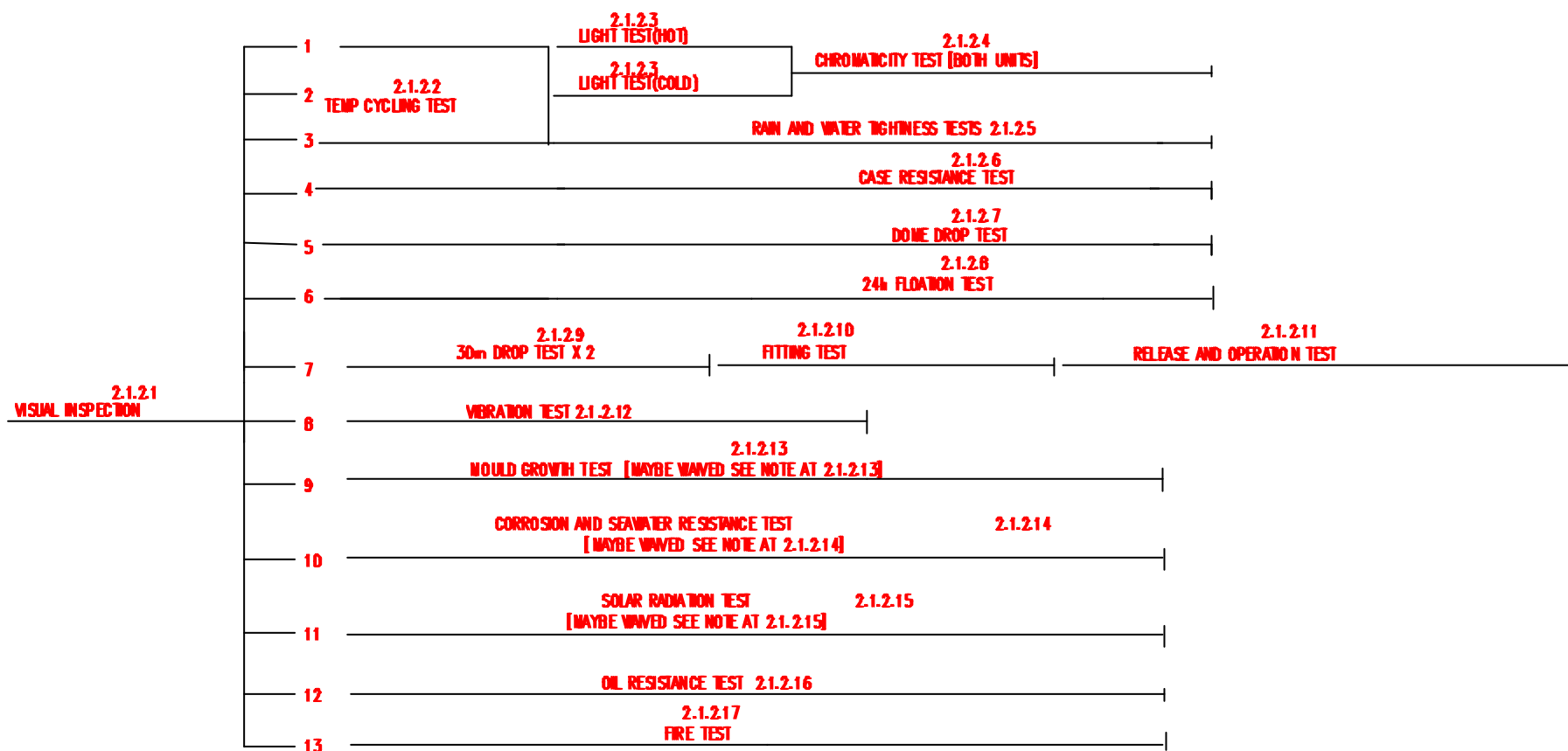
<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.2.1 Visual Inspection (continued)		Regulations: LSA Code 1.2.2.1/1.2.2.6/1.2.2.9/1.2.2.10/1.2.3	
Test Procedure	Acceptance Criteria	Significant Test Data	
Construction and materials	<p>The lifebuoy self-igniting lights should :</p> <p>- be constructed with proper workmanship and materials.</p>	<p><u>Results:</u></p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	



<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

### LIFEBUOY LIGHTS TEST FLOWCHART



<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.2 Temperature Cycling Test	Regulations: LSA Code 1.2.2.2; MSC.81(70) 1/ 1.2, 1.2.1, 1.2.2, 10.2, 10.2.1
Test Procedure	Acceptance Criteria
<p>Three lifebuoy self-igniting lights should be alternately subjected to surrounding temperatures of not less than – 30<sup>0</sup>C and at least +65<sup>0</sup>C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of not less than 10 cycles, is acceptable :</p> <ol style="list-style-type: none"> <li>1. at least an 8 h cycle at not less than +65<sup>0</sup>C to be completed in one day; and</li> <li>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</li> <li>3. at least an 8 h cycle at not less than 30<sup>0</sup>C to be completed the next day; and</li> <li>4. the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.</li> </ol>	<p>The lifebuoy self-igniting lights should not be damaged in stowage throughout the air temperature range of at least -30°C to +65°C. The lifebuoy self-igniting lights should show no sign of loss of rigidity under high temperatures and, after the tests, should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should function after the test.</p>
	<p style="text-align: center;"><u>Results:</u></p> <p>Attach temperature cycling chart to record times spent at Each temperature.</p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.2	Temperature cycling test – Test data		Regulations: LSA Code I/1.2.2; MSC.81(70) 1/1.2	
	<i>HOT CYCLE</i>		<i>COLD CYCLE</i>	
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.3 Light Tests	Regulations: LSA Code 2.1.2/2.1.2.2/2.1.2.3; MSC.81(70) 1/ 10.2.2, 10.4, 10.4.9
Test Procedure	Acceptance Criteria
<p>One lifebuoy self-igniting light which has passed the temperature cycling test should be taken from a stowage temperature of -30<sup>0</sup>C and then be operated immersed in seawater at a temperature of -1<sup>0</sup>C, and one lifebuoy self-igniting light which has passed the temperature cycling test should be taken from a stowage temperature of +65<sup>0</sup>C and be operated immersed in seawater at a temperature of +30<sup>0</sup>C. At the end of the first hour of operation the lifebuoy self-igniting lights should be immersed to a depth of 1 m for 1 min.</p> <p>If the voltage at 5 min of operation is lower than the recorded voltage at the end of life it is permissible to use a lamp from the same build standard for the light output test. Using the lowest recorded voltage a light output test can be carried out as described below. The voltage of the 2 test units should be monitored continuously for 2 h. To make sure that both test units provide a luminous intensity of not less than 2 cd in all directions of the upper hemisphere for 2 h operation, the following test should be performed :</p>	<p>After immersion, both lifebuoy self-igniting lights should not be extinguished and should contain operating for at least an hour longer.</p> <p>They should continue to provide a luminous intensity of not less than 2 cd in all directions of the upper hemisphere or, in the case of a flashing light, flash at a rate of not less than 50 flashes and not more than 70 flashes per minute with at least the corresponding effective luminous intensity of not less than 2 cd for at least 2 h. (see formula below to calculate the effective luminous intensity.)</p>
	<p><u>Results:</u></p> <p>All luminous intensity data is to be attached here.</p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.3 Light Tests (continued)	Regulations: LSA Code 2.1.2/2.1.2.2/2.1.2.3; MSC.81(70) 1/10.2.2, 10.4, 10.4.9
Test Procedure	Acceptance Criteria
<p>It must be demonstrated that both lights reach the required luminous intensity in all directions of the upper hemisphere when using a photometer which is calibrated to the photometric standards of the appropriate National or State Standard Institute (Note: CIE Publ. No. 70 contains further information.). Luminous intensity of both lights should be measured by a photometer directed at the center of the light source with the test light on a rotating table. Luminous intensity should be measured in a horizontal direction at the level of the center of the light source and continuously recorded through a 360° rotation. The first measurement should be taken at 0° (horizontal) and should continue to be taken in the azimuth angle at 5° intervals to a single measurement at 90° (vertical).</p> <p>Luminous intensity should be measured in a vertical direction, beginning at the center of the light source at the point of lowest recorded light output, and continuously recorded through an arc of 180°.</p> <p>All measured data of luminous intensity and voltage should be documented.</p>	<p>The effective luminous intensity is to be found from the formula :</p> $\left[ \frac{\int_{t_1}^{t_2} I dt}{0.2 + (t_2 - t_1)} \right]_{\max}$ <p>where :</p> <p>I is the instantaneous intensity, 0.2 is the Blondel - Rey constant and <math>t_1</math> and <math>t_2</math> are time - limits of integration in seconds.</p> <p>Note: Flashing lights with a flash duration of not less than 0.3 s at or above 2 cd, not including incandescence time, may be considered as fixed lights for the measurement of luminous intensity. Such lights should provide the required luminous intensity in all directions of the upper hemisphere. (Incandescence time is the time interval between switch on and the luminous intensity reaching the required minimum luminous intensity).</p>
	<p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.4Chromaticity Test		Regulations: LSA Code 2.1.2.2; MSC.81(70) 1/10.2.2, 10.4, 10.4.10	
Test Procedure	Acceptance Criteria	Significant Test Data	
Both lifebuoy self-igniting lights which have passed the light tests should be tested for chromaticity to determine that it lies within the boundaries of the area "white" of the diagram specified for each colour by the International Commission on Illumination (CIE). The chromaticities of the lifebuoy self-igniting lights should be measured by means of colorimetric measurement equipment which is calibrated to the appropriate National or State Standards Institute (Note: CIE Publ. No. 15.2 contains further information.). Measurement on at least four points of the upper hemisphere should be taken.	<p>The measured chromaticity coordinates should fall within the boundaries of the area of the diagram as per CIE. The boundaries of the area for white lights are given by the following corner coordinates:</p> <p>x 0.500 0.500 0.440 0.300 0.300 0.440 y 0.382 0.440 0.433 0.344 0.278 0.382</p> <p>(International Standard on Colours of Light Signals, with colour tables to be developed by CIE.)</p>	<p><u>Results:</u> All chromaticity data is to be attached here.</p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	

<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.2.5 Rain Test and Watertightness Test		Regulations: LSA Code 1.2.2.8; MSC.81(70) 1/10.2.5, 10.4.7
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifebuoy self-igniting light which has passed the temperature cycling test should be subjected to the rain test according to IEC 945, paragraph 8.8. After having passed the rain test, the lifebuoy self-igniting light and its complete power source should be immersed horizontally under not less than 300 mm of fresh water for at least 24 h.</p> <p>After that test, the lifebuoy self-igniting light should be tested for function. After having tested its function, and if it is an electric light, it should be disassembled and examined for the presence of water.</p> <p>Automatic activated version should be prevented from switching during these tests.</p>	<p>The lifebuoy self-igniting light should be rot-proof and, if it is to be used in a seaway, be capable of satisfactory operation in that environment.</p> <p>The lifebuoy self-igniting light should function after immersion under water.</p> <p>The lifebuoy self-igniting light should comply with the requirements of IEC 945, paragraph 8.8.2.</p> <p>There should be no evidence of water inside the lifebuoy self-igniting light.</p>	<p><u>Results :</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.6 Case Resistance Test	Regulations: MSC.81(70) 1/10.2.7
Test Procedure	Acceptance Criteria
<p>One lifebuoy self-igniting light should be placed on its side on a rigid surface and a steel sphere having a mass of 500 g should be dropped from a height of 1.3 m on to the case at least three times. The sphere should strike the case near its centre on one drop, approximately 12 mm from one end of the case on another drop and approximately 12 mm from the other end of the case on the third drop.</p>	<p>The case should not break or crack, or be distorted in a way that would affect its watertightness.</p> <p>The lifebuoy self-igniting light should function after the test.</p>
Test Procedure	Significant Test Data
<p>If a lifebuoy self-igniting light has a dome, it should be subjected to the dome drop test.</p> <p>The lifebuoy self-igniting light should be cooled to -18<sup>0</sup>C and dropped twice from a height of 1 m on to a rigidly mounted steel plate or concrete surface. The distance should be measured from the top of the dome to the impact surface. The lifebuoy self-igniting light should strike the surface on the top centre of the dome.</p>	<p><u>Results :</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>
2.1.2.7 Dome Drop Test	Regulations: MSC.81(70) 1/10.2.6
Test Procedure	Acceptance Criteria
<p>If a lifebuoy self-igniting light has a dome, it should be subjected to the dome drop test.</p> <p>The lifebuoy self-igniting light should be cooled to -18<sup>0</sup>C and dropped twice from a height of 1 m on to a rigidly mounted steel plate or concrete surface. The distance should be measured from the top of the dome to the impact surface. The lifebuoy self-igniting light should strike the surface on the top centre of the dome.</p>	<p>The dome should not break or crack.</p> <p>The lifebuoy self-igniting light should function after the test.</p>
Test Procedure	Significant Test Data
<p>If a lifebuoy self-igniting light has a dome, it should be subjected to the dome drop test.</p> <p>The lifebuoy self-igniting light should be cooled to -18<sup>0</sup>C and dropped twice from a height of 1 m on to a rigidly mounted steel plate or concrete surface. The distance should be measured from the top of the dome to the impact surface. The lifebuoy self-igniting light should strike the surface on the top centre of the dome.</p>	<p><u>Results :</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>



<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.2.8 Floatation Test		Regulations: LSA Code 1.2.2.8; MSC.81(70) 1/10.2.4
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifebuoy self-igniting light should be subjected to the floatation test. If the unit has an automatic activation, it should be disabled during this test.</p> <p>The lifebuoy self-igniting light should be allowed to float in water in its normal operating position for 24 h.</p> <p>If the lifebuoy self-igniting light is an electric light, it should be disassembled at the end of the tests and examined for the presence of water.</p>	<p>The lifebuoy self-igniting light should be capable of satisfactory operation in a seaway.</p> <p>The lifebuoy self-igniting light should function after the test and there should be no evidence of water inside the lifebuoy self-igniting light.</p>	<p><u>Results :</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.9 Drop Test		Regulations: LSA Code 2.1.2.4/2.1.1.6; MSC.81(70) 1/1.3, 10.2.3	
Test Procedure	Acceptance Criteria	Significant Test Data	
<p>One lifebuoy self-igniting light which has passed the visual inspection should be subjected to the drop test.</p> <p>The lifebuoy self-igniting light should be subjected to at least two drop tests as follows :</p> <p>The lifebuoy self-igniting light should be dropped into the water from a height of at least 30 m. The lifebuoy self-igniting light should be dropped twice, first by itself and then attached to a lifebuoy.</p> <p>On sea activated lights this test should be carried out with the sealing plugs fitted to prevent the ingress of water which will cause the light to operate.</p> <p>After having passed the drop test the light should be subjected next to the fitting test.</p>	<p>The lifebuoy self-igniting light should withstand this test without impairing either its operating capability or that of its attached components.</p> <p>The lifebuoy self-igniting light should not suffer damage and should operate satisfactorily after each drop.</p>	<p><u>Results :</u></p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	
2.1.2.10 Fitting Test		Regulations: MSC.81(70) 1/10.2.8	
Test Procedure	Acceptance Criteria	Significant Test Data	
<p>The lifebuoy self-igniting light which has passed the drop test should be subjected to the fitting test.</p> <p>A force of 225 N should be applied to the fitting and lanyard that attaches the lifebuoy self-igniting light to a lifebuoy.</p> <p>After having passed the fitting test the light should be subjected to the release and operation test.</p>	<p>Neither the fitting and lanyard nor the lifebuoy self-igniting light should be damaged as a result of this test.</p> <p>The lifebuoy self-igniting light should function after the test.</p>	<p><u>Results :</u></p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	

<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.2.11 Release and Operation Test		Regulations: LSA Code 2.1.1.7; MSC.81(70) 1/1.8
Test Procedure	Acceptance Criteria	Significant Test Data
One lifebuoy intended for quick release with the lifebuoy self-igniting light which has passed the fitting test and a smoke signal should be given this test. The chemical material intended to produce the smoke should be substituted by an equivalent non-dangerous material. The lifebuoy should be arranged in a manner simulating its installation on a ship for release from the navigating bridge. The lifebuoy self-igniting light and a smoke signal should be attached to the lifebuoy in the manner recommended by the manufacturer. The lifebuoy should be released.	The lifebuoy should activate the lifebuoy self-igniting light.	<u>Results :</u>  PASS: _____ FAIL: _____  Comments/Observations
2.1.2.12 Vibration Test		Regulations: LSA Code 1.2.2.1/1.2.2.8; MSC.81(70) 1/10.4, 10.4.1
Test Procedure	Acceptance Criteria	Significant Test Data
One lifebuoy self-igniting light which has passed the visual inspection should be subjected to a vibration test according to IEC 945 paragraph 8.7.	The lifebuoy self-igniting light should be constructed with proper workmanship and materials  The lifebuoy self-igniting light should function after the test.	<u>Results:</u>  PASS: _____ FAIL: _____  Comments/Observations

<b>Lifebuoy Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.2.13 <b>Mould Growth Test</b>	<b>Regulations: LSA Code 1.2.2.4; MSC.81(70) 1/10.4, 10.4.2</b>
Test Procedure	Acceptance Criteria
<p>One lifebuoy self-igniting light which has passed the visual inspection should be subjected to the mould growth test.</p> <p>The lifebuoy self-igniting light should be inoculated by spraying with an aqueous suspension of mould spores containing all the following cultures :</p> <p>Aspergillus niger; Aspergillus terreus; Aureobasidium pullulans; Paecilomyces variotii; Penicillium funiculosum; Penicillium ochrochloron; Scopulariopsis brevicaulis; and Trichoderma viride.</p> <p>The lifebuoy self-igniting craft light should then be placed in a mould growth chamber which should be maintained at a temperature of 29<sup>0</sup>C +/- 1<sup>0</sup>C and a relative humidity of not less than 95 %. The period of incubation should be 28 days. After this period the lifebuoy self-igniting light should be inspected.</p> <p>(Note: The mould growth test may be waived where the manufacturer is able to produce evidence that the external materials employed will satisfy the test.)</p>	<p>The lifebuoy self-igniting light should be rot-proof and not be unduly affected by fungal attack.</p> <p>There should be no mould growth visible to the naked eye and the lifebuoy self-igniting light should function after the test.</p>
	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.2.14 Corrosion and Seawater Resistance Test		Regulations: LSA Code 1.2.2.4; MSC.81(70) 1/10.4, 10.4.4
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifebuoy self-igniting light which has passed the visual inspection should be subjected to a corrosion and seawater resistance test according to IEC 945, paragraph 8.12.</p> <p>(Note :</p> <p>.1 If there are no exposed metal parts the Corrosion and Seawater Resistance Test need not be conducted.</p> <p>.2 The Corrosion and Seawater Resistance Test may be waived where the manufacturer is able to produce evidence that the external metals employed will satisfy the test.</p> <p>.3 Automatic activated version should be prevented from switching during the test.)</p>	<p>The lifebuoy self-igniting light should be corrosion resistant and not be unduly affected by seawater.</p> <p>Furthermore, the lifebuoy self-igniting light should comply with the requirements of IEC 945, paragraph 8.12.2.</p> <p>There should be no undue deterioration of metal parts and the lifebuoy self-igniting light should function after the test.</p> <p>Where the exposed metal is part of the automatic switch sensor, the function test after the 28 day test cannot be done.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>
2.1.2.15 Solar Radiation Test		Regulations: LSA Code 1.2.2.5; MSC.81(70) 1/10.4, 10.4.5
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifebuoy self-igniting light which has passed the visual inspection should be subjected to a solar radiation test according to IEC 945, paragraph 8.10.</p> <p>(Note: The solar radiation test may be waived where the manufacturer is able to produce evidence that the materials employed will satisfy the test, i.e. UV stabilized.)</p>	<p>The lifebuoy self-igniting light should be resistant to deterioration by sunlight.</p> <p>Furthermore, the mechanical properties and labels should be resistant to harmful deterioration by sunlight and the lifebuoy self-igniting light should function after the test.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifebuoy Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.1.2.16 Test for Oil Resistance</b>		<b>Regulations: LSA Code 1.2.2.4; MSC.81(70) 1/10.4,10.4.6</b>
Test Procedure	Acceptance Criteria	Significant Test Data
One lifebuoy self-igniting light which has passed the visual inspection should be subjected to the test for oil resistance according to IEC 945 paragraph 8.11. Automatic activated version should be prevented from switching during the test.	<p>After this test the lifebuoy self-igniting light should not be unduly affected by oil and should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.</p> <p>The lifebuoy self-igniting light should function after the test.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>
<b>2.1.2.17 Fire Test</b>		<b>Regulations: LSA Code 2.1.1.5; MSC.81(70) 1/10.4,10.4.8</b>
Test Procedure	Acceptance Criteria	Significant Test Data
One lifebuoy self-igniting light which has passed the visual inspection should be subjected to a fire test. A test pan not less than 30 cm x 35 cm x 6 cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to a depth of at least 1 cm followed by enough petrol to make a minimum total depth of not less than 4 cm. The petrol should then be ignited and allowed to burn freely for at least 30 s. The lifebuoy self-igniting light should then be moved through the flames, facing them, with the lifebuoy self-igniting light not more than 25 cm above the top edge of the test pan so that the duration of exposure to the flames is at least 2 s.	<p>The lifebuoy self-igniting light should not sustain burning or continue melting after being totally enveloped in a fire for a period of not less than 2 s and after being removed from the flames.</p> <p>The lifebuoy self-igniting light should function after the test.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

## **2.1.3 LIFEBUOY SELF ACTIVATING SMOKE SIGNALS**

### **EVALUATION AND TEST REPORT**

- 2.1.3.1 Submitted drawings, reports and documents
  - 2.1.3.1.1 Quality assurance
  - 2.1.3.1.2 Visual inspection
  - 2.1.3.1.3 General Data and Specification
- 2.1.3.2 Temperature cycling test
- 2.1.3.3 Low Temperature Conditioning Test
- 2.1.3.4 High Temperature Conditioning Test
- 2.1.3.5 Ambient Temperature Conditioning and Drop Test
- 2.1.3.6 Humidity Conditioning
- 2.1.3.7 Water and Corrosion Resistance Test
  - 2.1.3.7.1 Immersed for 24 h under 1 m
  - 2.1.3.7.2 Salt Spray Conditioning
- 2.1.3.8 Heptane Test
- 2.1.3.9 Laboratory Smoke Obscuration Test
- 2.1.3.10 Wave Test
- 2.1.3.11 Attachment Fitting Strength Test
- 2.1.3.12 Safety Inspection

### 2.1.3 LIFEBOUY SELF ACTIVATING SMOKE SIGNALS

#### EVALUATION AND TEST REPORT

<b>Manufacturer</b>	
<b>Type/Model</b>	
<b>Date of Approval</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	



Manufacturer:_____		Date:_____	Time:_____
<b>Lifebuoy Self Activating Smoke Signals</b>	Model:_____	Surveyor:_____	
Lot/Serial Number:_____		Organization:_____	

2.1.3.1 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

Manufacturer:_____		Date:_____		Time:_____	
<b>Lifebuoy Self Activating Smoke Signals</b>		Model:_____		Surveyor:_____	
Lot/Serial Number:_____		Organization:_____			

2.1.3.1.1 Quality Assurance	Regulations: -
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: -</p> <p>Quality Assurance Procedure: -</p> <p>Quality Assurance Manual: -</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>

<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.1.2 Visual Inspection		Regulations: LSA Code I/1.2; MSC.81(70) 1/1.9 and 4.5	
Test Procedure	Acceptance Criteria	Significant Test Data	
Visual examination	Lifebuoy Self-Activating Smoke Signal should: -		
Approval markings	be clearly marked with approval information including the Administration which approved it, date of manufacture and expiry and operational restrictions, markings are to be indelible;	Passed _____	Failed
Operating instructions.	be provided with brief instructions or diagrams clearly illustrating the use of the lifebuoy self-activating smoke signal printed on the casing also the method of manual operation;	Passed _____	Failed
Outer casing.	not depend on adhesive tapes or plastic envelopes for its water-resistant properties	Passed _____	Failed
Ignition System.	be fitted with an integral means of ignition;	Passed _____	Failed
Fitted with light	if fitted with lights be tested in accordance with the requirements of Lifebuoy Self-Igniting lights, section 10.2.	Passed _____	Failed
Acceptable life	The administration should determine the period of acceptability of the unit which are subject to deterioration with age.	Comments/Observations	

	Manufacturer: _____	Date: _____	Time: _____
<b>Lifebuoy Self Activating Smoke Signals</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.1.3 General Data and Specifications	Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.6	
General Information	Dimensions	Weight
<p>Construction Material:</p> <p>Casing: _____</p> <p>Top cover (If applicable): _____</p> <p>Bottom Cover (If applicable) : _____</p> <p>Method of Ignition _____</p> <p>Operational Safety Delay (if Applicable) _____</p> <p>Number of lights (if Applicable) _____</p> <p>Type of lens dome _____</p> <p>Amperage of Bulb _____</p> <p>Number of Batteries _____</p> <p>Voltage of Batteries _____</p> <p>Acceptable life of the item _____ yrs</p>	<p>Dimensions:</p> <p>Length of Casing: _____</p> <p>Maximum Diameter of Casing: _____</p> <p>Minimum Diameter of Casing _____</p>	<p>Design Weight: _____</p> <p>Weight As Tested: _____</p> <p>Weight of Smoke Material _____</p> <p>Comments/Observations</p>

**LIFEBUOY SELF ACTIVATING SMOKE SIGNAL CONDITIONING & SEQUENCE TEST CHART**

<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

TEST ITEMS									REFERENCES	REMARKS
CONDITIONING SEQUENCE	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22	MSC 81(70)	
Measuring dimensions and mass	A	A	A	A	A	A	A	A		
Temperature cycling test (2.1.3.2)	B	B	B						1.9.1 & 1.2.1.	
Low temperature conditioning (2.1.3.3)	C								1.9.2	
High temperature conditioning (2.1.3.4)		C							1.9.2	
Ambient temperature conditioning (2.1.3.5)			C						1.9.2	
Operate Immersed under 25mm for 10 secs (2.1.3.4)		C							1.9.2	
Humidity conditioning (2.1.3.6)				C					1.9.4 & 4.2.4	
1 metre for 24 hours (2.1.3.7.1)					C				1.9.4 & 4.3.1	
Salt water spray (2.1.3.7.2)						C			1.9.4 & 4.3.3	
Safety inspection (2.1.3.12)	D	D	D	D	D	D	D	D	4.5	
Operation at ambient temperature			E		E	E	E	E	1.9.3, 4.3.1	

	Manufacturer: _____	Date: _____	Time: _____
<b>Lifebuoy Self Activating Smoke Signals</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

**LIFEBOUY SELF ACTIVATING SMOKE SIGNAL CONDITIONING & SEQUENCE TEST CHART (continued)**

Specimen No. ->	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22	References	Remarks
Operate at conditioning Temperature	E	E		E					1.9.2, 4.2.4	
Heptane test (2.1.3.8)							F		1.9.4 & 4.8.2	
Attachment fitting strength (2.1.3.11)	F	F							10.2.8	May be carried out by an independent laboratory acceptable to the administration and report submitted. Use specimens 1 and 4
Wave height test (2.1.3.10)								F	1.9.5	
30 m drop test (2.1.3.5)			H						1.9.3	
Smoke colour and emission time 15 minutes minimum	G	G	G	G	G	G	G	G	1.9.2 & 1.9.3	
Smoke obscuration (2.1.3.8)									4.8.3	May be carried out by an independent laboratory acceptable to the administration and report submitted.

Note: The letters in the above 'boxes' refer to the sequence of testing of each specimen Lifebuoy Self Activating Smoke Signal.

2.1.3.2 Temperature cycling test		Regulations: LSA Code I/1.2.2; MSC.81(70) I/1.9 – 1.2.1																												
Test Procedure	Acceptance Criteria	Significant Test Data																												
<p>Nine self-activating smoke signals should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <ol style="list-style-type: none"> <li>1. an 8 h cycle at +65°C to be completed in one day; and</li> <li>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</li> <li>3. an 8 h cycle at -30°C to be completed the next day; and</li> <li>4. the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day;</li> </ol>	<p>After 10 cycles each specimen should be inspected and should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.</p>	<p><u>Specimen No.</u></p> <table> <tr> <td>1.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>2.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>3.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>4.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>5.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>6.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>7.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>8.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>9.</td> <td>Passed _____</td> <td>Failed _____</td> </tr> </table> <p>Comments/Observations</p> <p>Passed _____ Failed _____</p>		1.	Passed _____	Failed _____	2.	Passed _____	Failed _____	3.	Passed _____	Failed _____	4.	Passed _____	Failed _____	5.	Passed _____	Failed _____	6.	Passed _____	Failed _____	7.	Passed _____	Failed _____	8.	Passed _____	Failed _____	9.	Passed _____	Failed _____
1.	Passed _____	Failed _____																												
2.	Passed _____	Failed _____																												
3.	Passed _____	Failed _____																												
4.	Passed _____	Failed _____																												
5.	Passed _____	Failed _____																												
6.	Passed _____	Failed _____																												
7.	Passed _____	Failed _____																												
8.	Passed _____	Failed _____																												
9.	Passed _____	Failed _____																												

	Manufacturer: _____	Date: _____	Time: _____
<b>Lifebuoy Self Activating Smoke Signals</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.3Low temperature conditioning test		Regulations: LSA Code I/1.2.2; MSC.81(70) 1/1.9.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
After at least ten complete temperature cycles three smoke signals should be subjected to a temperature of -30°C for at least 48 h, then taken from this stowage temperature be activated and operated in seawater at a temperature of -1°C, and function effectively at that temperature.	The 3 specimens should function effectively.  Each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties after completing the -30°C conditioning.  The signal should not ignite explosively or in a manner dangerous to persons close by, nor emit any flame during the entire smoke emission time of at least 15 min.  The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	Specimen Number		
		1	2	3
		Condition after Conditioning (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke emission quality (Pass/Fail)		
		Smoke colour (Pass/Fail)		
Comments/Observations				
Passed_____ Failed _____				





	Manufacturer: _____	Date: _____	Time: _____
<b>Lifebuoy Self Activating Smoke Signals</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.5 Ambient Temperature Conditioning & Drop Test		Regulations: LSA Code I/1.2.2 & II/2.1.1.6; MSC.81(70) 1/1.9.3		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>After at least ten complete temperature cycles three smoke signals taken from ordinary room conditions and attached by a line to a lifebuoy should undergo a drop test.</p> <p>A lifebuoy and the smoke signal should be dropped each into the water from the height at which they are intended to be stowed on ships in their lightest seagoing condition, or 30 m, whichever is the greater, without suffering damage</p> <p>The lifebuoy and smoke signals should be dropped from a quick release fitting used for housing the signals.</p>	<p>The 3 specimens should function effectively.</p> <p>Each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties after completing the +65°C conditioning.</p> <p>The smoke signal should not ignite explosively or in a manner dangerous to persons close by nor emit any flame during the entire smoke emission time.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	Specimen No.		
		7	8	9
		Condition after Conditioning (Pass/Fail)		
		Drop height (metre)		
		Smoke emission time (min/sec)		
		Smoke emission quality (Pass/Fail)		
		Smoke colour (Pass/Fail)		
		Comments/Observations		
Passed_____ Failed _____				

<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.6 Humidity conditioning		Regulations: LSA Code I/1.2.2 & II/2.1.3; MSC.81(70) 1/4.2.4		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of smoke signals should be subjected to a temperature of +65°C and 90% relative humidity for at least 96 h, followed by ten days at 20°C to 25°C at 65% relative humidity.</p> <p>After the humidity test the specimens should be subjected to the function test at ambient temperature.</p>	<p>The 3 specimens should function effectively.</p> <p>Each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties after completing the +65°C conditioning.</p> <p>The smoke signal should not ignite explosively or in a manner dangerous to persons close by nor emit any flame during the entire smoke emission time.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	Specimen No.		
		10	11	12
		Condition after Conditioning (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke emission quality (Continuous/Intermittent)		
		Smoke emission colour: (Passed/Failed)		
Comments/Observations				
Passed _____ Failed _____				

	Manufacturer:_____	Date:_____	Time:_____
<b>Lifbuoy Self Activating Smoke Signals</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.3.7.11 m immersion for 24 hours test		Regulations: LSA Code I/1.2.2 and II/2.1.3; MSC.81(70) 1/4.3.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of smoke signal should be immersed horizontally for 24 h under 1 m of water.</p> <p>After this test the specimens should be subjected to the function test at ambient temperature.</p>	<p>The three specimens should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.</p> <p>The signals should establish that it can be operated effectively without injury to the operator, or any person in close proximity, during firing or burning.</p> <p>The specimen signal should not ignite explosively or in a manner dangerous to persons close by, nor emit any flame during the entire smoke emission time. They should emit smoke of a highly visible colour at a uniform rate for a period of not less than 15 minutes when floating in calm water.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	Specimen No.		
		13	14	15
		Condition after Conditioning (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke emission quality (Continuous/Intermittent)		
		Smoke emission colour: Passed/Failed		
		Comments/Observations		
		Passed _____ Failed _____		

<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.7.2Salt Spray Conditioning		Regulations: LSA Code I/1.2.2 & II/2.1.3; MSC.81(70) 1/4.4.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of smoke signals should be subjected to a salt spray (5% natrium chloride solution) at a temperature of +35±3°C for at least 100 h.</p> <p>The three signals should be activated at ambient temperature in accordance with the manufacturer's operating instructions.</p>	<p>The three specimens should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.</p> <p>The signals should establish that it can be operated effectively without injury to the operator, or any person in close proximity, during firing or burning.</p> <p>The specimen signal should not ignite explosively or in a manner dangerous to persons close by, nor emit any flame during the entire smoke emission time. They should emit smoke of a highly visible colour at a uniform rate for a period of not less than 15 minutes when floating in calm water.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	Specimen No		
		16	17	18
		Condition after Conditioning (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke emission quality (Continuous/Intermittent)		
		Smoke emission colour: Passed/Failed		
Comments/Observations				
Passed _____ Failed _____				

2.1.3.8 Heptane test		Regulations: LSA Code I/1.2.2 & II/2.1.3.1; MSC.81(70) 1/4.8.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three smoke signals should function in water covered by 2 mm layer of heptane floating on a layer of water. The smoke signal should be allowed to burn completely.</p>	<p>The three specimens should not ignite the heptane.</p> <p>The specimen signal should not ignite explosively or in a manner dangerous to persons close by, nor emit any flame during the entire smoke emission time.</p> <p>They should emit smoke of a highly visible colour at a uniform rate for a period of not less than 15 minutes when floating in calm water.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	Specimen No		
		19	20	21
		Heptane ignition (Passed/Failed)		
		Smoke emission time (min/sec)		
		Smoke emission quality (Continuous/Intermittent)		
		Smoke emission colour: (Passed/Failed)		
Comments/Observations				
<p>Passed _____ Failed _____</p>				

<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.9 Laboratory smoke obscuration test		Regulations: LSA Code I/1.2.2 & II/2.1.3; MSC.81(70) 1/4.8.3
Test Procedure	Acceptance Criteria	Significant Test Data
Laboratory testing of the smoke signal should establish that at least 70% obscuration throughout the minimum emission time is attained when the smoke is drawn through a 19 cm diameter duct by a fan capable of producing an entrance airflow of 18.4 m³/min.	The testing laboratory report should confirm that at least 70% obscuration rate throughout the minimum emission time of 15 min is maintained and meets the requirements.	Laboratory Testing Report No.  Report acceptable (Yes/No)  Smoke obscuration rate achieved at –30°C _____ %  Burning time of smoke signal _____ sec  Smoke obscuration rate achieved at +20°C _____ %  Burning time of smoke signal _____ sec  Smoke obscuration rate achieved at +65°C _____ %  Burning time of smoke signal _____ sec  Colour of smoke achieved  Comments/Observations  

<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.1.3.10</b>	<b>Wave test</b>	<b>Regulations: LSA Code I/1.2.2 &amp; II/2.1.3; MSC.81(70) 1/1.9.5</b>
Test Procedure	Acceptance Criteria	Significant Test Data
A smoke signal should be tested in waves at least 300 mm high.	<p>The specimen should function effectively and not be swamped.</p> <p>The smoke signal should not ignite explosively or in a manner dangerous to persons close by, nor emit any flame during the entire smoke emission time.</p> <p>It should emit smoke of a highly visible colour at a uniform rate for a period of not less than 15 minutes when subjected to waves of at least 300 mm high.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	<p><u>Specimen No. 22</u></p> <p>Smoke emission time _____ sec</p> <p>Smoke emission quality (Continuous/Intermittent) _____</p> <p>Smoke emission colour: Passed/Failed</p> <p>Comments/Observations</p> <p>Passed _____ Failed _____</p>



<b>Lifebuoy Self Activating Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.11 Attachment fitting strength test	Regulations: LSA Code I/1.2.2, II/2.1.3 & II/2.1.1.6; MSC.81(70) 1/10.2.8
Test Procedure	Acceptance Criteria
<p>A force of 225 N should be applied to the fitting that attaches the smoke signal to the lifebuoy. The test is to be carried out at temperatures of -30°C and +65°C.</p>	<p>The smoke signal or the fitting should not be damaged as a result of the test.</p>
	<p style="text-align: center;">Significant Test Data</p> <p>1. Test at -30°C(specimen 1)</p> <p>Load applied to fitting _____ N</p> <p>Strength test      Passed _____ Failed _____</p> <p>2. Test at +65°C(specimen 4)</p> <p>Load applied to fitting _____ N</p> <p>Strength test      Passed _____ Failed _____</p> <p>Comments/Observations</p> <p>Passed _____ Failed _____</p>

	Manufacturer: _____	Date: _____	Time: _____
<b>Lifebuoy Self Activating Smoke Signals</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.1.3.12 Safety inspection	Regulations: LSA Code I/1.2.2
Test Procedure	Acceptance Criteria
<p>It should be established by visual inspection that the self-activating smoke signal:</p> <p>1. is indelibly marked with clear and precise instructions on how it should be operated and mounted and that the danger end can be identified by day or night;</p> <p>2. does not depend on adhesive tapes or plastic envelopes for its water resistant properties; and</p> <p>3. can be indelibly marked with means of determining its age.</p>	<p>Clear and precise operating and mounting instructions are marked on the smoke signal.</p> <p>Adhesive tapes or plastic envelopes are not used to maintain water-resistant properties.</p> <p>Date of manufacturing and date of expiry indelible printed on the outside.</p>
	<p>Significant Test Data</p> <p>Markings and identification of signal: -</p> <p>Passed _____ Failed _____</p> <p>Water resistant without the use of envelopes or adhesive tape.</p> <p>Passed _____ Failed _____</p> <p>Smoke signal indelible date stamped</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

## **2.2 LIFEJACKETS AND ASSOCIATED EQUIPMENT**

### **2.2.1 INHERENTLY BUOYANT LIFEJACKETS**

#### **EVALUATION AND TEST REPORT**

- 2.2.1.1 Submitted drawings, reports and documents
- 2.2.1.2 Quality assurance
- 2.2.1.3 Visual inspection
- 2.2.1.4 General data and specification
- 2.2.1.5 Temperature cycling test
- 2.2.1.6 Buoyancy test
- 2.2.1.7 Fire test
- 2.2.1.8 Oil resistance test
- 2.2.1.9 Test for materials, cover, tapes and seams
- 2.2.1.10 Body or lifting loop strength test
- 2.2.1.11 Shoulder strength test
- 2.2.1.12 Additional tests for lifejacket material other than cork or kapok – Stability under temperature cycling
- 2.2.1.13 Additional tests for lifejacket material other than cork or kapok – Water absorption test
- 2.2.1.14 Donning test
- 2.2.1.15 Preparation for water performance tests
- 2.2.1.16 Water performance tests – Righting test
- 2.2.1.17 Water performance tests – Drop test
- 2.2.1.18 Swimming and water emergence test
- 2.2.1.19 Children's lifejacket - Test subjects selection
- 2.2.1.20 Children's lifejacket - Water performance tests – Righting test
- 2.2.1.21 Children's lifejacket - Water performance tests – Drop test
- 2.2.1.22 Children's lifejacket - Mobility test

**2.2.1 INHERENTLY BUOYANT LIFEJACKETS**  
**EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

<b>Inherently Buoyant Lifejackets</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.1.1 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Inherently Buoyant Lifejackets</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.2.1.2 Quality Assurance</b>	<b>Regulations: -</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: _____</p> <p>Quality Assurance Procedure: _____</p> <p>Quality Assurance Manual: _____</p> <p>Description of System.</p> <p>Quality Assurance System acceptable      Yes_____ No_____</p> <p>Comments/Observations</p>

<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.3 Visual Inspection	Regulations: LSA Code I/1.2.2.1, 1.2.2.6, 1.2.2.7, 1.2.2.9 & 1.2.3												
Test Procedure	Acceptance Criteria												
<ol style="list-style-type: none"> <li>1. Approval markings.</li> <li>2. Retro-reflective tape</li> <li>3. Lifejacket light</li> <li>4. Donning and comfort</li> <li>5. Whistle</li> <li>6. Colour of lifejacket</li> </ol>	<p>Inherently buoyant lifejackets should:</p> <p>be clearly marked with approval information including the Administration which approved it, date of manufacturer and any operational restrictions</p> <p>be fitted with approved patches of retro-reflective material with a total area of at least 400 cm<sup>2</sup> according to IMO Res. 658(16). In the case of a reversible lifejacket, the arrangement should be complied with no matter which way the lifejacket is put on. Such material should be placed as high on the lifejacket as possible.</p> <p>have provision to be fitted with a light</p> <p>be so constructed that it is capable of being worn inside out or is clearly capable of being worn in one way and, as far as possible cannot be donned incorrectly. It should also be comfortable to wear;</p> <p>be fitted with a whistle firmly secured by a cord to the lifejacket.</p> <p>be of highly visible colour</p>												
	<table style="width: 100%;"> <tr> <td style="width: 50%;">Passed _____</td> <td style="width: 50%;">Failed _____</td> </tr> <tr> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>Passed _____</td> <td>Failed _____</td> </tr> <tr> <td>Passed _____</td> <td>Failed _____</td> </tr> </table> <p>Comments/Observations</p>	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____
Passed _____	Failed _____												
Passed _____	Failed _____												
Passed _____	Failed _____												
Passed _____	Failed _____												
Passed _____	Failed _____												
Passed _____	Failed _____												

2.2.1.4 General Data and Specifications		Regulations: LSA Code / MSC.81(70)	
<b>Construction Material :</b>  Fabric produced by: _____  Type: _____  Buoyant material produced by: _____ _____  Type: _____	<b>Additional equipment:</b>  Retro reflective material: - <input type="checkbox"/> YES <input type="checkbox"/> NO  Type: _____  Whistle : - <input type="checkbox"/> YES <input type="checkbox"/> NO  Type: _____  Light (if fitted): <input type="checkbox"/> YES <input type="checkbox"/> NO  Type: _____  Proper marking for children's lifejacket: <input type="checkbox"/> YES <input type="checkbox"/> NO		<b>Donning instructions:</b>  <input type="checkbox"/> YES <input type="checkbox"/> NO          Passed _____ Failed _____



<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.5 Temperature cycling test		Regulations: LSA Code I/1.2.2.2; MSC.81(70) 1/2.1 and 2.7.7	
Test Procedure		Acceptance Criteria	
<p>A lifejacket should be subjected to a temperature cycling test of surrounding temperatures of -30<sup>0</sup>C and +65<sup>0</sup>C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>1. an 8 h cycle at +65<sup>0</sup>C to be completed in one day; and</p> <p>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>3. an 8 h cycle at -30<sup>0</sup>C to be completed the next day; and</p> <p>4. the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>The lifejacket should then be externally examined. If the buoyancy material has not been subjected to the test 2.2.1.12, the lifejacket should also be examined internally.</p>		<p>The lifejacket material should show no signs of damage such as shrinking, swelling dissolution or changes of mechanical qualities</p>	
Significant Test Data			
<p>(See following page for test data)</p> <p>Passed _____ Failed _____</p> <p>If not cork or kapok has the buoyant material been tested according to 2.2.1.12.</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Comments/Observations</p>			

<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.5Temperature cycling test (Continued)		Regulations: LSA Code I/1.2.2.2; MSC.81(70) 1/2.1 and 2.7.7
Test Procedure	Acceptance Criteria	Significant Test Data
<p>Four of the specimens should be used for water absorption tests, two of which should be so tested after they have also been subjected to the diesel oil test as prescribed in 2.2.1.8</p> <p>The Specimen should be at least 300mm square and be of the same thickness as used in the lifejacket.</p>		<p>Comments/Observations</p>

<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.5	Temperature cycling test – Test data	Regulations: LSA Code I/1.2.2; MSC.81(70) 1/2.1			
	<i>HOT CYCLE</i>		<i>COLD CYCLE</i>		
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	

<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.6 Buoyancy test		Regulations: LSA Code II/2.2.1.7; MSC.81(70) 1/2.2						
Test Procedure	Acceptance Criteria	Significant Test Data						
<p>The two lifejackets subjected to temperature cycling and the hot and cold inflation test should then be used for the buoyancy test.</p> <p>The buoyancy of the two lifejackets should be measured before and after 24 h complete submersion to just below the surface in fresh water. The test to be repeated as many times as necessary to perform the test once with each compartment in the uninflated condition.</p>	<p>The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy.</p>	<p>Buoyancy test method:_____</p> <p>Start (time):_____</p> <p>Temperature: _____ Pressure: _____</p> <p>Finish (time):_____</p> <p>Temperature: _____ Pressure: _____</p> <p>Pressure/Temperature corrections:</p> <p>_____</p> <table><tr><td>Buoyancy 1</td><td>Buoyancy 2</td><td>%difference</td></tr><tr><td>_____kg</td><td>_____kg</td><td>_____%</td></tr></table> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>	Buoyancy 1	Buoyancy 2	%difference	_____kg	_____kg	_____%
Buoyancy 1	Buoyancy 2	%difference						
_____kg	_____kg	_____%						

<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

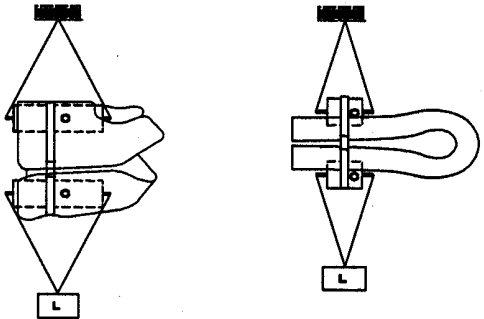
2.2.1.7Fire test		Regulations: LSA Code II/2.2.1.1; MSC.81(70) 1/2.3	
Test Procedure	Acceptance Criteria	Significant Test Data	
A test pan 30x35x6cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to make a minimum total depth of 1 cm followed by enough petrol to make a minimum dept of 4 cm. The petrol should then be ignited and allowed to burn freely for 30 s. The lifejacket should then be moved through the flames in an free-hanging position, with the bottom of the lifejacket is 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 s	The lifejacket should not sustain burning or continue melting after being removed from the flames.	Passed _____	Failed _____
		Comments/Observations	

2.2.1.8Oil resistance test		Regulations: LSA Code II/1.2.2; MSC.81(70) 1/2.4.1 & 2.4.2	
Test Procedure	Acceptance Criteria	Significant Test Data	
The lifejacket should be immersed horizontally for a period of 24 h under 100 mm head of diesel oil at normal room temperature.	After this test the lifejacket should show no signs of damage, such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.	Passed _____	Failed _____
		Comments/Observations	

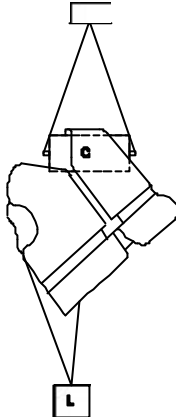
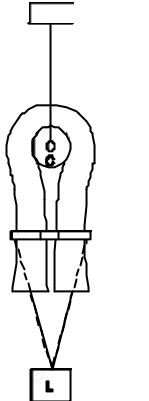
	Manufacturer: _____	Date: _____	Time: _____
<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.9 Tests for materials, cover, tapes and seams	Regulations: LSA Code I/1.2.2; MSC.81(70) 1/2.5	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The materials used for the cover, tapes, seams and additional equipment should be tested to establish that they are:</p> <p>.1 rot - proof,</p> <p>.2 colour-fast and</p> <p>.3 resistant to deterioration from exposure to sunlight</p> <p>and that they are not unduly affected by</p> <p>.4 seawater,</p> <p>.5 oil or</p> <p>.6 fungal attack</p>	<p>The results should be to the satisfaction of the Administration.</p>	<p>Tests: (Specify _____)</p> <p style="text-align: right;"><u>Cover:</u>   <u>Tapes:</u>   <u>Seams:</u>   <u>Additional</u>   <u>equipment:</u></p> <p>Tensile strength as received (new material) (N/25 mm width) : _____</p> <p>Tear strength as received (N) : _____ <u>N/A</u>   <u>N/A</u> _____</p> <p>.1   Tensile strength after microbial exposure Method: _____ Duration: _____</p> <p>(N/25 mm width)   _____ (% retained strength)   _____</p> <p>.2   Resistance to rubbing, wet and dry – (ISO 105-X12 &amp; 105-E02) Cycles: _____ : _____</p> <p>.3   Tensile strength after weathering Weathering Method: _____ Duration: _____ (N/25 mm width)   _____ (% retained strength)   _____</p> <p>.4   Tensile strength after exposure to sea water. Method: _____ Duration: _____ (N/25 mm width)   _____ (% retained strength)   _____</p> <p>.5   Tensile strength after exposure to oil. Type of oil: _____ Duration: _____ (N/25 mm width)   _____ (% retained strength)   _____</p> <p>.6   Tensile strength after fungal attach. Type of oil: _____ Duration: _____ (N/25 mm width)   _____ (% retained strength)   _____</p> <p>Acceptable:      1) <input type="checkbox"/> Yes <input type="checkbox"/> No   2) <input type="checkbox"/> Yes <input type="checkbox"/> No   3) <input type="checkbox"/> Yes <input type="checkbox"/> No                          4) <input type="checkbox"/> Yes <input type="checkbox"/> No   5) <input type="checkbox"/> Yes <input type="checkbox"/> No   6) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>

	Manufacturer: _____	Date: _____	Time: _____
<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.10 Body or lifting loop strength tests	Regulations: LSA Code I/1.2.2; MSC.81(70) 1/2.6.1																												
Test Procedure	Acceptance Criteria	Significant Test Data																											
<p>The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed in the same manner as when it is worn by a person. A force of not less than 3,200 N (2,400 N in the case of a child-size lifejacket) should be applied for 30 min to the part of the lifejacket that secures it to the body of the wearer (see figure 1) or to the lifting loop of the lifejacket.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Vest-type lifejacket      Yoke or over-the-head type lifejacket</p> <p style="text-align: center;"><b>Fig 1</b></p> <p style="text-align: center;">C= Cylinder 125mm adult sizes 50mm child size</p> <p style="text-align: center;">L= Test load</p>	<p>The lifejacket should not be damaged as a result of this test</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td></td><td style="text-align: center;">Body strap</td><td style="text-align: center;">Lifting loop</td></tr> <tr> <td>Force applied:</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr> <td>Time:</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr> <td>Slippage:</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr> <td colspan="3">Closure(s) tested: _____</td></tr> <tr> <td colspan="3">Illustration of lifejacket lifting loop test arrangement if tested:</td></tr> <tr> <td colspan="3">Test results</td></tr> <tr> <td>Closure system:</td><td colspan="2" style="text-align: center;">Passed _____ Failed _____</td></tr> <tr> <td>Lifting loop:</td><td colspan="2" style="text-align: center;">Passed _____ Failed _____</td></tr> </table>		Body strap	Lifting loop	Force applied:	_____	_____	Time:	_____	_____	Slippage:	_____	_____	Closure(s) tested: _____			Illustration of lifejacket lifting loop test arrangement if tested:			Test results			Closure system:	Passed _____ Failed _____		Lifting loop:	Passed _____ Failed _____	
	Body strap	Lifting loop																											
Force applied:	_____	_____																											
Time:	_____	_____																											
Slippage:	_____	_____																											
Closure(s) tested: _____																													
Illustration of lifejacket lifting loop test arrangement if tested:																													
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	Manufacturer: _____	Date: _____	Time: _____
<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.11 Shoulder strength test		Regulations: LSA Code I/1.2.2; MSC.81(70) 1/2.6.2
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed in the same manner as when it is worn by a person. A force of not less than 900 N (700 N in the case of a child-size lifejacket) should be applied for 30 min to the shoulder section of the lifejacket (see fig 2).</p> <div><div><p>Vest-type lifejacket</p></div><div><p>Yoke or over-the-head-type lifejacket</p></div></div> <p>Fig 2</p> <p>C= Cylinder 125mm adult sizes 50mm child sizes</p> <p>L= Test load</p>	<p>The lifejacket should not be damaged as a result of this test</p>	<p>Force applied:_____</p> <p>Shoulder tested:_____</p> <p>Test result:</p> <p>Passed _____ Failed</p> <p>Comments/Observations</p>





	Manufacturer: _____	Date: _____	Time: _____
<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.12 Temperature cycling test – Test data			Regulations: LSA Code I/1.2.2; MSC.81(70) 1/2.1	
	<i>HOT CYCLE</i>		<i>COLD CYCLE</i>	
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

	Manufacturer: _____	Date: _____	Time: _____
<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.13 Additional tests for lifejacket material other than cork or kapok – Water absorption test		Regulations: LSA Code I/1.2.2; MSC.81(70) 1/2.7.5 – 2.7.8	
Test Procedure		Acceptance Criteria	
Significant Test Data			
The following tests should be carried out on six specimens of lifejacket buoyancy materials other than cork or kapok. The tests should be carried out in fresh water and the specimens should be immersed for a period of seven days under a 1.25 m head of water.		The specimens should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.	
The specimens should be at least 300 mm square and be of the same thickness as used in the lifejacket. Alternatively, the entire lifejacket may be subjected to the test. The dimensions should be recorded at the beginning and end of these tests.		The results should state the mass in kilograms, which each specimen could support out of the water after one and seven days immersion.	
The tests should be carried out:		The reduction of buoyancy should not exceed 16% for specimens which have been exposed to the diesel oil conditioning and should not exceed 5% for all specimens.	
.1 on two specimens as supplied;			
.2 on two specimens which have been subjected to the temperature cycling as prescribed in 2.2.1.12; and			
.3 on two specimens which have been subjected to the temperature cycling as prescribed in 2.2.1.12 followed by the diesel oil test as prescribed in 2.2.1.8.			
		Test results: (As supplied specimens)	
		After 1 day After 7 days %diff.	
		Specimen No. 1 kg kg %	
		Passed Failed	
		Specimen No. 2 kg kg %	
		Passed Failed	
		Test results: (Specimens subjected to temperature Cycling test.)	
		Specimen No. 3 kg kg %	
		Passed Failed	
		Specimen No. 4 kg kg %	
		Passed Failed	
		Test results: (Specimens subject to temperature cycling and oil exposure)	
		Specimen No. 5 kg kg %	
		Passed Failed	
		Specimen No. 6 kg kg %	
		Passed Failed	
		Comments/Observations	

	Manufacturer:_____	Date:_____	Time:_____
<b>Inherently Buoyant Lifejackets</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.1.14 Donning Test		Regulations: LSA Code II/2.2.1.2 – 2.2.1.4; MSC.81(70) 1/2.8.1 to 2.8.5.2																																																																																																																																																																																																									
Test Procedure		Acceptance Criteria		Significant Test Data																																																																																																																																																																																																							
<p>As lifejackets will be used by uninitiated persons, often in adverse conditions, it is essential that risk of incorrect donning be minimised.</p> <p>The test should be carried out with at least six able-bodied persons of the following heights and weights:</p> <table><tr><th>Height</th><th>Weight</th></tr><tr><td>1.40m - 1.60m;</td><td>1 person under 60kg 1 person over 60kg</td></tr><tr><td>1.60m - 1.80m</td><td>1 person under 70kg 1 person over 70kg</td></tr><tr><td>over 1.80m</td><td>1 person under 80kg 1 person over 80kg</td></tr></table> <p>1. at least one and not more than two of the persons should be females with not more than one female in the same height range</p> <p>2. for the approval of the lifejackets, the test results obtained from each of the participating subjects should be acceptable except as provided otherwise.</p> <p>Each test subject should be tested wearing normal clothing</p> <p>The test should be repeated with the test subject wearing heavy-weather clothing.</p> <p>The observer should note :</p> <p>.1 ease and speed of donning, and</p> <p>.2 proper fit and adjustment.</p>		Height	Weight	1.40m - 1.60m;	1 person under 60kg 1 person over 60kg	1.60m - 1.80m	1 person under 70kg 1 person over 70kg	over 1.80m	1 person under 80kg 1 person over 80kg	<p>Ties and fastenings necessary for proper performance should be few and simple. Lifejackets should readily fit various sizes of adults, both lightly and heavily clad. Lifejackets should be capable of being worn inside-out, or clearly in only one way.</p> <p>At least 75% of the test subjects who are completely unfamiliar with the lifejacket should be able to done it within 1 min without assistance, guidance or prior demonstration.</p> <p>After demonstration, the test subjects should correctly don lifejackets within a period of 1 min without assistance.</p>		<table><tr><td></td><td>Male/Female</td><td>Height</td><td>Weight</td></tr><tr><td>Subject No.1</td><td></td><td></td><td></td></tr><tr><td>Subject No.2</td><td></td><td></td><td></td></tr><tr><td>Subject No.3</td><td></td><td></td><td></td></tr><tr><td>Subject No.4</td><td></td><td></td><td></td></tr><tr><td>Subject No.5</td><td></td><td></td><td></td></tr><tr><td>Subject No.6</td><td></td><td></td><td></td></tr><tr><td colspan="4">Donning time without guidance</td></tr><tr><td></td><td>Time</td><td>Passed</td><td>Failed</td></tr><tr><td>Subject No. 1</td><td></td><td></td><td></td></tr><tr><td>Subject No. 2</td><td></td><td></td><td></td></tr><tr><td>Subject No. 3</td><td></td><td></td><td></td></tr><tr><td>Subject No. 4</td><td></td><td></td><td></td></tr><tr><td>Subject No. 5</td><td></td><td></td><td></td></tr><tr><td>Subject No. 6</td><td></td><td></td><td></td></tr><tr><td colspan="4">Donning time Normal clothing</td></tr><tr><td></td><td>Time</td><td>Passed</td><td>Failed</td></tr><tr><td>Subject No. 1</td><td></td><td></td><td></td></tr><tr><td>Subject No. 2</td><td></td><td></td><td></td></tr><tr><td>Subject No. 3</td><td></td><td></td><td></td></tr><tr><td>Subject No. 4</td><td></td><td></td><td></td></tr><tr><td>Subject No. 5</td><td></td><td></td><td></td></tr><tr><td>Subject No. 6</td><td></td><td></td><td></td></tr><tr><td colspan="4">Proper fit and adjustment with normal clothing</td></tr><tr><td></td><td>Passed</td><td>Failed</td><td></td></tr><tr><td>Subject No. 1</td><td></td><td></td><td></td></tr><tr><td>Subject No. 2</td><td></td><td></td><td></td></tr><tr><td>Subject No. 3</td><td></td><td></td><td></td></tr><tr><td>Subject No. 4</td><td></td><td></td><td></td></tr><tr><td>Subject No. 5</td><td></td><td></td><td></td></tr><tr><td>Subject No. 6</td><td></td><td></td><td></td></tr><tr><td colspan="4">Donning time with heavy weather clothing</td></tr><tr><td></td><td>Time</td><td>Passed</td><td>Failed</td></tr><tr><td>Subject No. 1</td><td></td><td></td><td></td></tr><tr><td>Subject No. 2</td><td></td><td></td><td></td></tr><tr><td>Subject No. 3</td><td></td><td></td><td></td></tr><tr><td>Subject No. 4</td><td></td><td></td><td></td></tr><tr><td>Subject No. 5</td><td></td><td></td><td></td></tr><tr><td>Subject No. 6</td><td></td><td></td><td></td></tr><tr><td colspan="4">Proper fit and adjustment with heavy weather clothing</td></tr><tr><td></td><td>Passed</td><td>Failed</td><td></td></tr><tr><td>Subject No. 1</td><td></td><td></td><td></td></tr><tr><td>Subject No. 2</td><td></td><td></td><td></td></tr><tr><td>Subject No. 3</td><td></td><td></td><td></td></tr><tr><td>Subject No. 4</td><td></td><td></td><td></td></tr><tr><td>Subject No. 5</td><td></td><td></td><td></td></tr><tr><td>Subject No. 6</td><td></td><td></td><td></td></tr></table>					Male/Female	Height	Weight	Subject No.1				Subject No.2				Subject No.3				Subject No.4				Subject No.5				Subject No.6				Donning time without guidance					Time	Passed	Failed	Subject No. 1				Subject No. 2				Subject No. 3				Subject No. 4				Subject No. 5				Subject No. 6				Donning time Normal clothing					Time	Passed	Failed	Subject No. 1				Subject No. 2				Subject No. 3				Subject No. 4				Subject No. 5				Subject No. 6				Proper fit and adjustment with normal clothing					Passed	Failed		Subject No. 1				Subject No. 2				Subject No. 3				Subject No. 4				Subject No. 5				Subject No. 6				Donning time with heavy weather clothing					Time	Passed	Failed	Subject No. 1				Subject No. 2				Subject No. 3				Subject No. 4				Subject No. 5				Subject No. 6				Proper fit and adjustment with heavy weather clothing					Passed	Failed		Subject No. 1				Subject No. 2				Subject No. 3				Subject No. 4				Subject No. 5				Subject No. 6			
		Height	Weight																																																																																																																																																																																																								
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	Manufacturer:_____	Date:_____	Time:_____
<b>Inherently Buoyant Lifejackets</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.1.15Preparation for water performance tests		Regulations: LSA Code II/2.2.1.2.5 & 2.2.1.3 – 2.2.1.4; MSC.81(70) 1/2.9 to 2.9.3																																																																																																				
Test Procedure	Acceptance Criteria	Significant Test Data																																																																																																				
<p>This portion of the test is intended to determine the ability of the lifejacket to assist a helpless person or one in an exhausted or unconscious state and to show that the lifejacket does not unduly restrict movement.</p> <p>All tests should be carried out in fresh water under still conditions.</p> <p>The test subjects should wear only swimming costumes.</p> <p>These tests should be carried out with at least six persons as mentioned in paragraph 2.2.1.14.</p> <p>Each test subject should be made familiar with each of the tests in 2.2.16 and 2.2.17, particularly the requirements regarding relaxing and exhaling in the face-down position.</p> <p>The test subjects should don the lifejacket, unassisted, using only the instructions provided by the manufacturer. The observer should note ease and speed of donning, and proper fit and adjustment.</p> <p>Only good swimmers should be used, since the ability to relax in the water is rarely otherwise obtained.</p>		<p>Test subjects same as in 2.2.14?</p> <p>If not, describe test subjects:</p> <table><tr><td></td><td>Male/Female</td><td>Height</td><td colspan="2">Weight</td></tr><tr><td>Subject No.1</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No.2</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No.3</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No.4</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No.5</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No.6</td><td></td><td></td><td colspan="2"></td></tr></table> <p>Donning time</p> <table><tr><td></td><td>Time</td><td>Passed</td><td colspan="2">Failed</td></tr><tr><td>Subject No. 1</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 2</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 3</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 4</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 5</td><td></td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 6</td><td></td><td></td><td colspan="2"></td></tr></table> <p>Proper fit and adjustment</p> <table><tr><td></td><td>Passed</td><td colspan="2">Failed</td></tr><tr><td>Subject No. 1</td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 2</td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 3</td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 4</td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 5</td><td></td><td colspan="2"></td></tr><tr><td>Subject No. 6</td><td></td><td colspan="2"></td></tr></table> <p>Comments/Observations</p>				Male/Female	Height	Weight		Subject No.1					Subject No.2					Subject No.3					Subject No.4					Subject No.5					Subject No.6						Time	Passed	Failed		Subject No. 1					Subject No. 2					Subject No. 3					Subject No. 4					Subject No. 5					Subject No. 6						Passed	Failed		Subject No. 1				Subject No. 2				Subject No. 3				Subject No. 4				Subject No. 5				Subject No. 6			
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2.2.1.16	Water performance tests – Righting test	Regulations: LSA Code II/ 2.2.1.3.2; MSC 81(70)1/ 2.9.5 and 2.9.7			
<p>The test subject should swim at least three gentle strokes (breaststroke) and then with minimum headway relax, with head down and the lungs partially filled, simulating a state of utter exhaustion. The test should be repeated after the test subj. has exhaled.</p> <p>Record time from completion of last stroke until mouth comes clear of the water</p> <p>The freeboard to the mouth, trunk angle and faceplane angle should be recorded after the test subject comes to rest</p>	<p>The test subject should come to rest with the mouth clear of the water by at least 120 mm. The average of all subjects' trunk angles should be at least 30° back of vertical, and each individual subject's angle should be at least 20° back of vertical. The average of all subjects' faceplane (head) angles should be at least 40° above horizontal, and each individual subject's angle should be at least 30° above horizontal. The mouth should be clear of the water in not more than 5 sec. The lifejacket should not become dislodged or cause harm to the test subject.</p> <p>The Administration may, in exceptional circumstances, disregard the results of a test on a subject if the results show a very slight deviation from the specified criteria, provided the Administration is satisfied that the deviation can be attributed to the unusual size and stature characteristics of the test subject and the results of tests on other subjects show the satisfactory performance of the lifejacket. Explain under comments/observations.</p>	Turning 1 (Sec)	Turning 2 (Sec)		
		<p>Subject No.1</p> <p>Subject No.2</p> <p>Subject No.3</p> <p>Subject No.4</p> <p>Subject No.5</p> <p>Subject No.6</p>	Freeboard (mm)	Body angle (deg)	Faceplane (deg)
		<p>Subject No.1</p> <p>Subject No.2</p> <p>Subject No.3</p> <p>Subject No.4</p> <p>Subject No.5</p> <p>Subject No.6</p>			
		Slowest turn time: _____ sec			
		Minimum individual freeboard _____ mm			
		Minimum individual trunk angle: _____ Deg.			
		Average trunk angles, all subjects: _____ Deg			
		Minimum individual face plane (head) angle: _____ Deg			
		Average faceplane (head) angle, all subjects: _____ Deg			
		Did the lifejacket become dislodged or cause harm to the test subject?: _____			
		Did the light become detached or dislodged?: _____			
		Is the position of the light in accordance with the LSA Code? _____			
		Is the retro reflective tape correctly fitted?: _____			
		Passed _____ Failed _____			
		Comments/Observations			



	Manufacturer:_____	Date:_____	Time:_____
<b>Inherently Buoyant Lifejackets</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.1.18      Swimming and water emergence test	Regulations: LSA Code II/2.2.1.4; MSC.81(70) 1/2.9.9
Test Procedure	Acceptance Criteria
<p>All test subjects, without wearing the lifejacket, should attempt to swim 25 m and board a liferaft or rigid platform with its surface 300 mm above the water surface. All test subjects who successfully complete this task should perform it again wearing the lifejacket.</p>	<p>At least two-thirds of the subjects who can accomplish the task without the lifejacket should also be able to perform it with the lifejacket.</p>
	<p style="text-align: center;">Significant Test Data</p> <p>1)    25m swim and boarding without lifejacket.</p> <p style="text-align: center;">Passed                  Failed</p> <p>Subject No.1 Subject No.2 Subject No.3 Subject No.4 Subject No.5 Subject No.6</p> <p>2)    25 m swim and boarding with lifejacket.</p> <p style="text-align: center;">Passed                  Failed</p> <p>Subject No.1 Subject No.2 Subject No.3 Subject No.4 Subject No.5 Subject No.6</p> <p>Could at least two thirds of the subjects who could accomplish the task without a lifejacket also perform it with the lifejacket?</p> <p>Passed_____ Failed_____</p> <p>Apparatus used:</p> <p>Comments/Observations</p>



<b>Inherently Buoyant Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.19 Children's lifejacket - Test subjects selection	Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.1 – 2.10.2
Test Procedure	Acceptance Criteria
<p>As far as possible, similar tests (to the adult tests) should be applied for approval of lifejackets suitable for children</p> <p>Test subjects should be selected to fully represent the range of sizes for which the device is to be approved. Devices for smaller children should be tested on children as small as approximately 760mm tall and 9kg mass. At least six test subjects should be used for each 380mm and 16 kg of size range.</p> <p><u>Preparations for water performance tests.</u></p> <ol style="list-style-type: none"> <li>1. Subjects should wear only swimming costumes.</li> <li>2. As far as practical, only good swimmers who can relax in the water should be used.</li> <li>3. The test subjects should be made familiar with each of the tests set out below and the requirement to relax and exhale while face-down.</li> <li>4. All tests should be carried out in fresh water under still conditions.</li> </ol>	<p>The range of sizes for child-size lifejackets should be considered based on the test results. Devices should be sized by height or by height and weight.</p> <p>Test subjects physical characteristics:</p> <p>1) Height: 0,76m to 1,14m &amp; Weight: 9kg to 25kg.  <div style="display: flex; justify-content: space-around; width: 100%;"> <span>Height</span> <span>Weight</span> </div> Subject No.1  Subject No.2  Subject No.3  Subject No.4  Subject No.5  Subject No.6</p> <p>2) Height: 1,14m to 1,52m &amp; Weight: 25kg to 41kg.  <div style="display: flex; justify-content: space-around; width: 100%;"> <span>Height</span> <span>Weight</span> </div> Subject No.7  Subject No.8  Subject No.9  Subject No.10  Subject No.11  Subject No.12</p> <p>3) Height: 1.52m to 1.90m &amp; Weight: 41kg to 57kg.  <div style="display: flex; justify-content: space-around; width: 100%;"> <span>Height</span> <span>Weight</span> </div> Subject No.13  Subject No.14  Subject No.15  Subject No.16  Subject No.17  Subject No.18</p> <p>Comments/Observations</p>

	Manufacturer: _____	Date: _____	Time: _____
<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.1.20 Children's lifejacket - Water performance tests – Righting test	Regulations: LSA Code II/ 2.2.1.5; MSC 81(70)1/ 2.10.2.1																																																																																																																		
<p>The test subject should swim at least three gentle strokes (breaststroke) and then with minimum headway relax, with head down and the lungs partially filled, simulating a state of utter exhaustion. The test should be repeated after the test subject has exhaled.</p> <p>Record time from completion of last stroke until mouth comes clear of the water</p> <p>The freeboard to the mouth, trunk angle and faceplane angle should be recorded after the test subject comes to rest</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%;">Turning time 1 sec</th> <th style="width: 15%;">Turning time 2 sec</th> <th style="width: 15%;">Freeboard mm</th> <th style="width: 15%;">Trunk Angle degrees</th> <th style="width: 15%;">Head angle degrees</th> </tr> </thead> <tbody> <tr><td>Subj.No.1</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.2</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.3</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.4</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.5</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.6</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.7</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.8</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.9</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.10</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.11</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.12</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.13</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.14</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.15</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.16</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.17</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.18</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td><td>_____</td></tr> </tbody> </table> <p>Child-size lifejackets should meet the following requirements for their critical flotation stability characteristics.</p> <p>Turning time: Each individual subject must turn face-up in not more than 5 s.</p> <p>The combined results for clearance above the water for all subjects should average at least 90 mm; each individual subject under 1270 mm and 23 kg should have at least 50 mm clearance, and each individual subject over 1270 mm and 23 kg should have at least 75 mm clearance.</p> <p>The average of all subjects' trunk angles should be at least 40° back of vertical, and each individual's result should be at least 20° back of vertical.</p> <p>The average of all subjects' faceplane (head) angles should be at least 35° above horizontal, and each individual subject's result should be at least 20° above horizontal.</p> <p>Slowest turn time: _____ sec Average freeboard, all subjects: _____ mm</p> <p>Minimum freeboard subjects &lt; 1.27m and 23 kg: _____ mm</p> <p>Minimum freeboard subjects &gt; 1.27m and 23 kg: _____ mm</p> <p>Minimum individual trunk angle: _____ Deg.</p> <p>Average trunk angles, all subjects: _____ Deg</p> <p>Minimum individual face plane (head) angle: _____ Deg</p> <p>Average faceplane (head) angle, all subjects: _____ Deg</p> <p>Allowable range in height and weight based on test data: _____m, _____ kg</p> <p>Meets all criteria for allowable range:                      Passed <input type="checkbox"/>      Failed <input type="checkbox"/></p>		Turning time 1 sec	Turning time 2 sec	Freeboard mm	Trunk Angle degrees	Head angle degrees	Subj.No.1	_____	_____	_____	_____	_____	Subj.No.2	_____	_____	_____	_____	_____	Subj.No.3	_____	_____	_____	_____	_____	Subj.No.4	_____	_____	_____	_____	_____	Subj.No.5	_____	_____	_____	_____	_____	Subj.No.6	_____	_____	_____	_____	_____	Subj.No.7	_____	_____	_____	_____	_____	Subj.No.8	_____	_____	_____	_____	_____	Subj.No.9	_____	_____	_____	_____	_____	Subj.No.10	_____	_____	_____	_____	_____	Subj.No.11	_____	_____	_____	_____	_____	Subj.No.12	_____	_____	_____	_____	_____	Subj.No.13	_____	_____	_____	_____	_____	Subj.No.14	_____	_____	_____	_____	_____	Subj.No.15	_____	_____	_____	_____	_____	Subj.No.16	_____	_____	_____	_____	_____	Subj.No.17	_____	_____	_____	_____	_____	Subj.No.18	_____	_____	_____	_____	_____
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<b>Inherently Buoyant Lifejackets</b>	Model: _____	Surveyor: _____	
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2.2.1.21 Children's lifejacket - Water performance tests – Drop test	Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.2.1																																																																												
Test Procedure	Acceptance Criteria																																																																												
<p>Without readjusting the lifejacket, the test subject should jump vertically into the water, feet first, from a height of at least 4.5m.</p> <p>When jumping into the water, the test subject should be allowed to hold on to the lifejacket during water entry to avoid possible injury.</p> <p>The freeboard to the mouth, trunk angle, and faceplane angle should be recorded after the test subject comes to rest.</p> <p>Note: Water tests using children should avoid causing distress or risk to the child. Consideration should be taken of their age and ability.</p>	<p>Child-size lifejackets should meet the following requirements for their critical flotation stability characteristics.</p> <p>The combined results for clearance above the water for all subjects should average at least 90 mm; each individual subject under 1270 mm and 23 kg should have at least 50 mm clearance, and each individual subject over 1270 mm and 23 kg should have at least 75 mm clearance.</p> <p>The average of all subjects' trunk angles should be at least 40° back of vertical, and each individual's result should be at least 20° back of vertical.</p> <p>The average of all subjects' faceplane (head) angles should be at least 35° above horizontal, and each individual subject's result should be at least 20° above horizontal.</p>																																																																												
	Significant Test Data																																																																												
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 20%; text-align: center;">Freeboard mm</th> <th style="width: 20%; text-align: center;">Trunk Angle degrees</th> <th style="width: 30%; text-align: center;">Head angle degrees</th> </tr> </thead> <tbody> <tr><td>Subj.No.1</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.2</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.3</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.4</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.5</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.6</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.7</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.8</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.9</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.10</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.11</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.12</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.13</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.14</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.15</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.16</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.17</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.18</td><td>_____</td><td>_____</td><td>_____</td></tr> </tbody> </table> <p>Slowest turn time: _____ sec Average freeboard, all subjects: _____ mm</p> <p>Minimum freeboard subjects &lt; 1.27m and 23 kg: _____ mm</p> <p>Minimum freeboard subjects &gt; 1.27m and 23 kg: _____ mm</p> <p>Minimum individual trunk angle: _____ Deg.</p> <p>Average trunk angles, all subjects: _____ Deg</p> <p>Minimum individual face plane (head) angle: _____ Deg</p> <p>Average faceplane (head) angle, all subjects: _____ Deg</p> <p>Allowable range in height and weight based on test data: _____m, _____ kg</p> <p>Meets all criteria for allowable range:                      Passed <input type="checkbox"/>      Failed <input type="checkbox"/></p>		Freeboard mm	Trunk Angle degrees	Head angle degrees	Subj.No.1	_____	_____	_____	Subj.No.2	_____	_____	_____	Subj.No.3	_____	_____	_____	Subj.No.4	_____	_____	_____	Subj.No.5	_____	_____	_____	Subj.No.6	_____	_____	_____	Subj.No.7	_____	_____	_____	Subj.No.8	_____	_____	_____	Subj.No.9	_____	_____	_____	Subj.No.10	_____	_____	_____	Subj.No.11	_____	_____	_____	Subj.No.12	_____	_____	_____	Subj.No.13	_____	_____	_____	Subj.No.14	_____	_____	_____	Subj.No.15	_____	_____	_____	Subj.No.16	_____	_____	_____	Subj.No.17	_____	_____	_____	Subj.No.18	_____	_____	_____
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Subj.No.18	_____	_____	_____																																																																										

<b>Inherently Buoyant Lifejackets</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.1.22Children's lifejacket - Mobility test		Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.2.5			
Test Procedure		Acceptance Criteria		Significant Test Data	
To be considered in and out of the water.  Mobility of the subject both in and out of the water should be given consideration in determining the acceptability of a device for approval.				Does the lifejacket provide for acceptable mobility of the test subjects both in and out of the water?  YES <input type="checkbox"/> NO <input type="checkbox"/>  Passed _____ Failed _____  Method of evaluation:   Comments/Observations	

## **2.2.2 INFLATABLE LIFEJACKETS (ADULTS & CHILD)**

### **EVALUATION AND TEST REPORT**

- 2.2.2.1 Submitted drawings, reports and documents
- 2.2.2.2 Quality assurance
- 2.2.2.3 Visual inspection
- 2.2.2.4 General data and specification
- 2.2.2.5 Temperature cycling test
  - 2.2.2.5.1 Inflation system function
  - 2.2.2.5.2 Test data
- 2.2.2.6 Buoyancy test
- 2.2.2.7 Fire test
- 2.2.2.8 Oil resistance test
- 2.2.2.9 Test of materials for inflatable bladders, inflation systems and components
  - 2.2.2.9.1 Coated fabrics test
  - 2.2.2.9.2 Operating head load test
  - 2.2.2.9.3 Pressure test
  - 2.2.2.9.4 Compression test
  - 2.2.2.9.5 Test of metallic components
  - 2.2.2.9.6 Inadvertent inflation test
- 2.2.2.10 Body or lifting loop strength test
- 2.2.2.11 Shoulder strength test
- 2.2.2.12 Donning test (uninflated situation)
- 2.2.2.13 Donning test (inflated situation)
- 2.2.2.14 Preparation for water performance test
- 2.2.2.15 Water performance tests – Righting test
- 2.2.2.16 Water performance tests – Drop test
- 2.2.2.17 Swimming and water emergence test
- 2.2.2.18 Children's lifejacket tests – test subjects
- 2.2.2.19 Children's lifejacket tests Water performance Tests - Righting test
- 2.2.2.20 Children's lifejacket tests Water performance Tests - Drop test
- 2.2.2.21 Children's lifejacket mobility test

## **2.2.2 INFLATABLE LIFEJACKETS (ADULTS & CHILD)**

### **EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

<b>Inflatable Lifejackets</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.2.1 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Inflatable Lifejackets</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.2.2 Quality Assurance	Regulations: -
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: -</p> <p>Quality Assurance Procedure: -</p> <p>Quality Assurance Manual: -</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>



<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.3 Visual Inspection	Regulations: LSA Code I/1.2.2 & II/2.2
Test Procedure	Acceptance Criteria
<ol style="list-style-type: none"> <li>1. Approval markings</li> <li>2. Retro-reflective tape</li> <li>3. Lifejacket light</li> <li>4. Donning and comfort</li> <li>5. Whistle</li> <li>6. Colour of lifejacket</li> </ol>	<p>Inflatable lifejackets should:</p> <p>be clearly marked with approval information including the Administration which approved it, date of manufacturer and any operational restrictions</p> <p>be fitted with approved patches of retro-reflective material with a total area of at least 400 cm<sup>2</sup> according to IMO Res. 658(16). In the case of a reversible lifejacket, the arrangement should be complied with no matter which way the lifejacket is put on. Such material should be placed as high on the lifejacket as possible.</p> <p>have provision to be fitted with a light.</p> <p>be so constructed that it is capable of being worn inside out or is clearly capable of being worn in one way and, as far as possible cannot be donned incorrectly. It should also be comfortable to wear;</p> <p>be fitted with a whistle firmly secured by a cord to the lifejacket.</p> <p>be of highly visible colour</p>
	<div style="display: flex; justify-content: space-between;"> <div> <p>Passed _____</p> <p>Passed _____</p> <p>Passed _____</p> <p>Passed _____</p> <p>Passed _____</p> <p>Passed _____</p> </div> <div> <p>Failed _____</p> <p>Failed _____</p> <p>Failed _____</p> <p>Failed _____</p> <p>Failed _____</p> <p>Failed _____</p> </div> </div> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.4 General Data and Specifications	Regulations: LSA Code II/2.2; MSC.81(70)	
<p><b>Construction Material :</b></p> <p>Fabric produced by:</p> <p>Type:</p> <p>Inflation system produced by:</p> <p>Type:</p> <p>Cover fabric produced by:</p> <p>Type:</p> <p>Fabric for the inflatable chamber Produced by:</p> <p>Type:</p> <p>Size and type of gas:</p> <p>Means of activating the inflation system:</p>	<p><b>Additional equipment:</b></p> <p>Retro reflective material: -      <input type="checkbox"/> YES      <input type="checkbox"/> NO</p> <p>Type:</p> <p>Whistle : -      <input type="checkbox"/> YES      <input type="checkbox"/> NO</p> <p>Type:</p> <p>Light (if fitted):      <input type="checkbox"/> YES      <input type="checkbox"/> NO</p> <p>Type:</p> <p>Marked size range: _____</p> <p>Proper marking for children's lifejacket:      <input type="checkbox"/> YES      <input type="checkbox"/> NO</p>	<p><b>Donning instructions:</b></p> <p><input type="checkbox"/> YES      <input type="checkbox"/> NO</p>        <p>Passed _____ Failed _____</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.5 Temperature cycling test		Regulations: LSA Code I/1.2.2.2 & 1.2.2.3; MSC.81(70) 1/2.11.1	
Test Procedure		Acceptance Criteria	
<p>Two inflatable lifejackets should be subjected to a temperature cycling test of surrounding temperatures of -30<sup>0</sup>C and +65<sup>0</sup>C in the uninflated condition. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>1. an 8 h cycle at +65<sup>0</sup>C to be completed in one day; and</p> <p>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>3. an 8 h cycle at -30<sup>0</sup>C to be completed the next day; and</p> <p>4. the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day;</p>		<p>Two uninflated Inflatable lifejackets after completion of the temperature cycling should be examined externally. The lifejackets should show no signs of damage such as shrinking, cracking, swelling dissolution or changes of mechanical qualities.</p>	
		Significant Test Data	
		<p>Examination</p> <p>1. Lifejacket</p> <p>Passed _____ Failed _____</p> <p>2. Lifejacket</p> <p>Passed _____ Failed _____</p> <p>3. Cold inflation test, auto inflation</p> <p>Temperature of water ____<sup>0</sup>C.</p> <p>Time to inflate and relief valves blowing ____ sec.</p> <p>Auto inflation Passed_____Failed</p> <p>4. Cold inflation test, manual inflation</p> <p>Temperature of water ____<sup>0</sup>C.</p> <p>Time to inflate and relief valves blowing ____ sec</p> <p>Manual inflation Passed_____Failed _____</p> <p>Comments/Observations</p>	

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.5.1      Temperature cycling test - Inflation system function		Regulations: LSA Code I/1.2.2.2 & 1.2.2.3; MSC.81(70) 1/2.11.1			
Test Procedure		Acceptance Criteria		Significant Test Data	
<p>The automatic and manual inflation systems should each be tested immediately after each temperature cycling test as follows:</p> <p>1.    After the high temperature cycle the two inflatable lifejackets take from a stowage temperature of + 65°C, one should be activated using the automatic inflation system by placing it in seawater at a temperature of + 30°C and the other should be activated using the manual inflation system; and</p> <p>2.    After the low temperature cycle the two inflatable lifejackets take from a stowage temperature of -30°C, one should be activated using the automatic inflation system by placing it in seawater at a temperature of -1°C and the other should be activated using the manual inflation system.</p>		<p>The lifejackets should function satisfactorily after these tests</p> <p>Temperature test data sheet on next page.</p>		<p><b>Hot inflation test, automatic inflation</b></p> <p>Temperature of water ____<sup>0</sup>C.</p> <p>Time to inflate and relief valves blowing ____ sec</p> <p>Automatic inflation Passed____Failed</p> <p><b>Hot inflation test, manual inflation</b></p> <p>Temperature of water ____°C.</p> <p>Time to inflate and relief valves blowing ____ sec</p> <p>Manual inflation Passed____Failed</p>	

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.5.2	Temperature cycling test – Test data	Regulations: LSA Code I/1.2.2.2 & 1.2.2.3; MSC.81(70) 1/2.11.1		
	<b>HOT CYCLE</b>	<b>COLD CYCLE</b>		
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.6 Buoyancy test	Regulations: LSA Code II/2.2.2.3, 2.2.1.7; MSC.81(70) 1/2.2
Test Procedure	Acceptance Criteria
<p>The two lifejackets subjected to temperature cycling and the hot and cold inflation test should then be used for the buoyancy test.</p> <p>The buoyancy of the two lifejackets should be measured before and after 24 h complete submersion to just below the surface in fresh water. The test to be repeated as many times as necessary to perform the test once with each compartment in the uninflated condition.</p> <p>(The following equipment and procedure, or suitable alternatives may be used to carry out the buoyancy test of the lifejacket:</p> <ol style="list-style-type: none"> <li>1. a mesh basket or tray large enough to contain the lifejacket and adequate weights to overcome the buoyancy of the lifejacket;</li> <li>2. a tank of fresh water large enough to accommodate the basket or tray and the lifejacket with the uppermost part of the lifejacket 50 mm below the surface of the water; and</li> <li>3. a spring balance accurate to <math>\pm 0.015</math> kg.</li> <li>4. water temperature to be recorded at the start of each test and then after 24 hours on completion of each test.)</li> </ol>	<p>The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy.</p> <p>The chamber should be fitted with correct gas cylinder.</p>
	<p style="text-align: center;">Significant Test Data</p> <p>1. Lifejacket No. 1</p> <p>Weight of the mesh basket with the lifejacket: _____Kg  Weight of the mesh basket without the lifejacket: _____Kg  Buoyancy of front chamber at start _____Kg.  Buoyancy of front chamber at 24 hr _____Kg.  Difference in buoyancy &lt; 5% _____Kg  Buoyancy of back chamber at start _____Kg.  Buoyancy of back chamber at 24 hr _____Kg.  Difference in buoyancy &lt; 5% _____Kg.</p> <p>Passed _____ Failed _____</p> <p>2. Lifejacket No. 2.</p> <p>Weight of the mesh basket with the lifejacket: _____Kg  Weight of the mesh basket without the lifejacket: _____Kg  Buoyancy of front chamber at start _____Kg.  Buoyancy of front chamber at 24 hr _____Kg.  Difference in buoyancy &lt; 5% _____Kg  Buoyancy of back chamber at start _____Kg.  Buoyancy of back chamber at 24 hr _____Kg.  Difference in buoyancy &lt; 5% _____Kg.</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____	
	Model: _____	Surveyor: _____		
	Lot/Serial Number: _____	Organization: _____		

2.2.2.7 Fire test		Regulations: LSA Code II/2.2.1.1; MSC.81(70) 1/2.3	
Test Procedure		Acceptance Criteria	
The chamber should be fitted with correct gas cylinder:		The two lifejackets should not sustain burning or continue melting after being removed from the flame. The inflated lifejacket should not deflate as a result of passing through the flames.	
The two inflatable lifejackets should be subjected to a fire test.		The lifejacket should remain inflated after completing this test.	
A test pan 30 cm x 35 cm x 6 cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to a depth of 1 cm followed by enough petrol to make a minimum depth of 4 cm. The petrol should then be ignited and allowed to burn freely for 30 s. The two lifejackets, one inflated the other uninflated, should then be moved through the flames in an upright, forward, free-hanging position, with the bottom of the lifejacket 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 s.			
Significant Test Data			
Size of pan _____ x _____ x _____ cm.			
1. Lifejacket No. 1			
Passed _____ Failed _____			
2. Lifejacket No. 2			
Passed _____ Failed _____			
Comments/Observations			

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.8 Oil resistance test	Regulations: LSA Code I/1.2.2.4; MSC.81(70) 1/2.4
Test Procedure	Acceptance Criteria
<p>Two of the inflatable lifejacket should be subjected to the oil resistance test.</p> <p>The lifejacket should be immersed horizontally for a period of 24 h under 100 mm head of diesel oil at normal room temperature.</p>	<p>After this test the lifejacket should be examined externally and should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.</p>
	Significant Test Data
	<p>Condition of Lifejacket No.1 after 24 hours.</p> <p>Passed _____ Failed _____</p> <p>Condition of Lifejacket No.2 after 24 hours.</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>



<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9 Tests of materials for inflatable bladders, inflation systems & components	Regulations: LSA Code I/1.2.2.1, 1.2.2.4 & 1.2.2.5; MSC.81(70) 1/2.11.4.1
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Test Procedure	Acceptance Criteria	Significant Test Data
<p>The materials used for the cover, tapes, seams and additional equipment should be tested to establish that they are:</p> <p>.1 rot – proof, according to AATCC Method 30:1981;</p> <p>.2 colour-fast; and</p> <p>.3 resistant to deterioration from exposure to sunlight, according to ISO 105-B04:1988, and that they are not unduly affected by</p> <p>.4 seawater;</p> <p>.5 oil; or</p> <p>.6 fungal attack</p>	<p>The results should be to the satisfaction of the Administration.</p>	<p>Tests: (Specify _____)</p> <p style="text-align: right; margin-right: 50px;"><u>Cover:</u>   <u>Tapes:</u>   <u>Seams:</u>   <u>Additional equipment:</u></p> <p>Tensile strength as received (new material) (N/25 mm width) : _____</p> <p>Tear strength as received (N) : _____ <u>N/A</u>   <u>N/A</u>   _____</p> <p>.1 Tensile strength after microbial exposure Method: _____ Duration: _____  (N/25 mm width) _____ (% retained strength) _____</p> <p>.2 Resistance to rubbing, wet and dry – (ISO 105-X12 &amp; 105-E02) Cycles: _____ : _____</p> <p>.3 Tensile strength after weathering Weathering Method: _____ Duration: _____ (N/25 mm width) _____ (% retained strength) _____</p> <p>.4 Tensile strength after exposure to sea water. Method: _____ Duration: _____ (N/25 mm width) _____ (% retained strength) _____</p> <p>.5 Tensile strength after exposure to oil. Type of oil: _____ Duration: _____ (N/25 mm width) _____ (% retained strength) _____</p> <p>.6 Tensile strength after fungal attach. Type of oil: _____ Duration: _____ (N/25 mm width) _____ (% retained strength) _____</p> <p>Acceptable:            1) <input type="checkbox"/> Yes <input type="checkbox"/> No   2) <input type="checkbox"/> Yes <input type="checkbox"/> No   3) <input type="checkbox"/> Yes <input type="checkbox"/> No                                  4) <input type="checkbox"/> Yes <input type="checkbox"/> No   5) <input type="checkbox"/> Yes <input type="checkbox"/> No   6) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.1 Coated fabrics test		Regulations: LSA Code I/1.2.2.1, 1.2.2.4 & 1.2.2.5; MSC.81(70) 1/2.11.4.2.1 - .4	
Test Procedure	Acceptance Criteria	Significant Test Data	
Coated fabrics used in the construction of inflatable buoyancy chambers should comply with the following requirements:-  1. Coating adhesion should be tested in accordance with ISO 2411: 1991 using the method described at 5.1 at 100mm/min  2. coating adhesion should be tested when wet following ageing according to ISO 188 with an exposure of 336 ± 0.5 h in fresh water at (70.0 ± 1.0) °C following which the method at ISO 2411: 1991 paragraph 5.1 should be applied at 100mm/min.  3. tear strength should be tested in accordance with ISO 4674: 1977 using method A1.  4. resistance to flex cracking should be tested in accordance with ISO 7854: 1984 method A using 9000 flex cycles.	(1) After being tested according to ISO 2411:1991, the coating adhesion should not be less than 50 N per mm width.  (2) After being tested according to ISO 188, the coating adhesion when wet should not be less than 40 N per mm.  (3) After being tested according to ISO 4674:1977, method A1 the tear strength should not be less than 35 N.  (4) After being tested according to ISO 7854:1984, method A there should be no visible cracking or deterioration.	1. Coating Adhesion (dry) - Test Results in the :- Warp _____N, Weft _____N  Passed _____ Failed _____  2. Coating Adhesion (wet) - Test Results in the :- Warp _____N, Weft _____N  Passed _____ Failed _____  3. Tear strength:- _____N  Passed _____ Failed _____  4. Flexure Test:-  Passed _____ Failed _____  Comments/Observations	

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.1 Coated fabric test (continued)		Regulations: LSA Code I/1.2.2.1, 1.2.2.4 & 1.2.2.5; MSC.81(70) 1/2.11.4.2.5 – 8			
Test Procedure		Acceptance Criteria		Significant Test Data	
5. breaking strength should be tested in accordance with ISO 1421: 1977 using the CRE or CRT method, following conditioning for 24 ± 0.5 h at room temperature and should not be less than 200 N per 50 mm width.		(5) After being tested according to ISO 1421:1977, the breaking strain should not be less than 200 N per 50 mm width.		5. Break Strength (dry). _____N:-  Passed _____ Failed _____	
6. breaking strength should be tested in accordance with ISO 1421: 1977 using the CRE or CRT method, following conditioning immersed in fresh water for 24 ± 0.5 h at room temperature and should not be less than 200 N per 50 mm width.		(6) After being tested according to ISO 1421:1977, the breaking strain should not be less than 200 N per 50 mm width.		6. Break Strength (wet). _____N: -  Passed _____ Failed _____	
7. elongation to break should be tested in accordance with ISO 1421: 1977 using the CRE or CRT method following conditioning at room temperature for 24 ± 0.5 h.		(7) After being tested according to ISO 1421:1977, in room temperature the elongation to break should not exceed 60%.		7. Elongation (dry) _____ %: -  Passed _____ Failed _____	
8. elongation to break should be tested in accordance with ISO 1421: 1977 using the CRE or CRT method following conditioning immersed in fresh water at room temperature for 24 ± 0.5 h.		(8) After being tested according to ISO 1421:1977, in fresh water at room temperature the elongation to break should not exceed 60%.		8. Elongation (wet) _____ %: -  Passed _____ Failed _____  Comments/Observations	

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.1 Coated fabric test (continued)	Regulations: LSA Code I/1.2.2.1, 1.2.2.1.4 & 1.2.2.1.5; MSC.81(70) 1/2.11.4.2.9 – 11
Test Procedure	Acceptance Criteria
<p>9. the resistance to exposure to light when tested in accordance with ISO 105-BO2: 1988.</p> <p>10. the resistance to wet and dry rubbing when tested in accordance with ISO 105-X12: 1995.</p> <p>11. the resistance to seawater should not be less than class 4 in accordance with ISO 105 EO2: 1978.</p>	<p>(9) After being exposed to light when tested in accordance with ISO 105 – B02:1988, the contrast between the unexposed and exposed samples should not be less than class 5.</p> <p>(10) After being wet and dry rubbed in accordance with ISO 105-X12:1995, the staining of the rubbed samples should not be less than class 3.</p> <p>(11) After being tested in accordance with ISO 105 EO2:1978, the change in colour of the specimen should not less than class 4.</p>
	Significant Test Data
	<p>9. Accelerated light test</p> <p>Class _____.</p> <p>Passed _____ Failed _____</p> <p>10. Wet staining after rubbing</p> <p>Class . _____.</p> <p>Passed _____ Failed _____</p> <p>11. Dry staining after rubbing</p> <p>Class . _____.</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.2 Operating head load test	Regulations: LSA Code I/1.2.2.1, 1.2.2.1.4 & 1.2.2.1.5; MSC.81(70) 1/2.11.4.3
Test Procedure	Acceptance Criteria
<p>The operating head load test should be carried out using two lifejackets one lifejacket to be conditioned at -30°C for 8 hours and the other at +65°C for 8 hours. After mounting on the manikin or the test form the lifejacket should be inflated, and a steady force of (220±10) N applied to the operating head as near as possible to the point where it enters the buoyancy chamber. This load should be maintained for 5 minutes during which the direction and angle in which it is applied should be continuously varied.</p>	<p>On completion of the test the lifejacket should remain intact and should hold its pressure for 30 minutes.</p>
	<p style="text-align: center;">Significant Test Data</p> <ol style="list-style-type: none"> <li>1. Security of operating head -30°C (Jacket 1) Load applied _____ N.</li> <li>2. Visible damage Passed _____ Failed _____</li> <li>3. Security of operating head +65°C (Jacket 2) Load applied _____ N.</li> <li>4. Visible damage Passed _____ Failed _____</li> <li>5. Pressure at the beginning of the test at -30°C and after 30 min. Jacket 1 _____ at the beginning _____ after 30 min</li> <li>6. Pressure at the beginning of the test at +65°C and after 30 min. Jacket 2 _____ at the beginning _____ after 30 min</li> </ol> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.3 Pressure test (1)	Regulations: LSA Code II/2.2.2.2; MSC.81(70) 1/2.11.4.4.1 - .2
Test Procedure	Acceptance Criteria
<p>The inflatable buoyancy chambers should be capable of withstanding an internal over pressure at ambient temperature. All chambers of a lifejacket should be inflated using the manual method of inflation, after inflation the relief valves should be disabled and a fully charged gas cylinder according to the manufacturers recommendation should be fitted to the same inflation device and fired. All fully charged gas cylinders used in this test should be sized according to the markings on lifejacket.</p>	<p>The lifejacket should remain intact and should hold its pressure for 30 minutes.</p> <p>The lifejackets should no signs of damage such as cracking, swelling or changes of mechanical qualities and that there has been no significant damage to the lifejacket inflation component.</p>
	<p style="text-align: center;">Significant Test Data</p> <ol style="list-style-type: none"> <li>1. Double charge test. Size of gas bottle _____ grams. Duration of test _____ min.</li> <li>2. <b>Chamber 1</b> - Pressure at the beginning of the test and after 30 min. _____ at the beginning _____ after 30 min</li> <li>3. <b>Chamber 2</b> - Pressure at the beginning of the test and after 30 min. _____ at the beginning _____ after 30 min</li> <li>4. <b>Chambers 3</b> - Pressure at the beginning of the test and after 30 min. _____ at the beginning _____ after 30 min</li> <li>5. <b>Chamber 4</b> - Pressure at the beginning of the test and after 30 min. _____ at the beginning _____ after 30 min</li> <li>6. Damage to lifejacket Passed _____ Failed _____</li> </ol> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.3 Pressure test (2)		Regulations: LSA Code; MSC.81(70) 1/2.11.4.2
Test Procedure	Acceptance Criteria	Significant Test Data
With one buoyancy chamber inflated, the operating head on the opposite buoyancy chamber should be fired manually, using a fully charged gas cylinder according to the manufacturers recommendations. The operation of the relief valves should be noted to ensure that the excess pressure is relieved.	The lifejacket should remain intact and should hold its pressure for 30 minutes.  The lifejackets should no signs of damage such as cracking, swelling or changes of mechanical qualities and that there has been no significant damage to the lifejacket inflation component.	1. Chamber 1 Size of gas bottle _____ grams.  Pressure at the beginning of the test and after 30 min. _____ at the beginning _____ after 30 min.
		2. Relief valve operation. Passed _____ Failed _____
		3. Damage to lifejacket Passed _____ Failed _____
		4. Chamber 2 Size of gas bottle _____ grams.  Pressure at the beginning of the test and after 30 min. _____ at the beginning _____ after 30 min.
		5. Relief valve operation. Passed _____ Failed _____
		6. Damage to lifejacket Passed _____ Failed _____
		Comments/Observations

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.3 Pressure test (2) Cont.	Regulations: LSA Code; MSC.81(70) 1/2.11.4.2
Test Procedure	Acceptance Criteria
	<p>7. <b>Chamber 3</b> Size of gas bottle _____ grams.</p> <p>Pressure at the beginning of the test and after 30 min.                                            _____ at the beginning                                            _____ after 30 min.</p> <p>8. Relief valve operation. Passed _____ Failed</p> <p>9. Damage to lifejacket Passed _____ Failed</p> <p>10. <b>Chamber 4</b> Size of gas bottle _____ grams.</p> <p>Pressure at the beginning of the test and after 30 min.                                            _____ at the beginning                                            _____ after 30 min.</p> <p>11. Relief valve operation. Passed _____ Failed</p> <p>12. Damage to lifejacket Passed _____ Failed</p> <p>Pressure after the test in each camber:  <u>Chamber 1:</u>  <u>Chamber 2:</u>  <u>Chamber 3:</u>  <u>Chamber 4:</u></p> <p>Comments/Observations</p>



<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.3 Pressure test (3)		Regulations: LSA Code; MSC.81(70) 1/2.11.4.4.3
Test Procedure	Acceptance Criteria	Significant Test Data
<p>Air retention test</p> <p>One inflation chamber of a lifejacket is filled with air until air escapes from the over-pressure valve or, if the lifejacket does not have an over-pressure valve, until its design pressure, as stated in the plans and specifications, is reached. This test is then repeated as many times as necessary to test a different chamber until each chamber has been tested in this manner.</p> <p>The pressure release valve should be settled when the measurement starts.</p>	After 12 h the drop in pressure should not be greater than 10%.	<p>1. <b>Air retention test Chamber 1:</b> Passed _____ Failed _____</p> <p>2. Pressure at the beginning of the test and after 12 h. _____ at the beginning _____ after 12 h _____ % drop</p> <p>1. <b>Air retention test Chamber 2:</b> Passed _____ Failed _____</p> <p>2. Pressure at the beginning of the test and after 12 h. _____ at the beginning _____ after 12 h _____ % drop</p> <p>1. <b>Air retention test Chamber 3:</b> Passed _____ Failed _____</p> <p>2. Pressure at the beginning of the test and after 12 h. _____ at the beginning _____ after 12 h _____ % drop</p> <p>1. <b>Air retention test Chamber 4:</b> Passed _____ Failed _____</p> <p>2. Pressure at the beginning of the test and after 12 h. _____ at the beginning _____ after 12 h _____ % drop</p> <p>Comments/Observations</p>

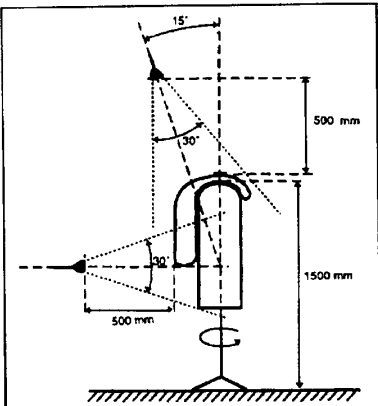
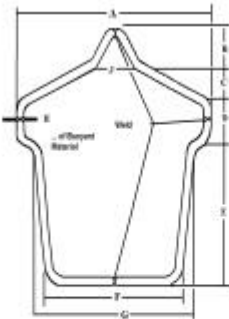
<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.4 <b>Compression test</b>	<b>Regulations: LSA Code; MSC.81(70) 1/2.11.4.5</b>
Test Procedure	Acceptance Criteria
<p>The inflatable lifejacket, packed in the normal manner should be laid on a table. A bag containing 75 kg of sand and having a base of 320 mm diameter should be lowered onto the lifejacket from a height of 150 mm in a time of 1 s. This should be repeat ten times, after which the bag should remain on the jacket for not less than 3 hours.</p>	<p>The lifejacket should be inflated by immersion into water and should inflate fully, the jacket to be inspected to ensure that no swelling or change of mechanical properties has occurred, the jacket should be checked for leaks</p>
Test Procedure	Significant Test Data
<p>Metal parts and components of a lifejacket should be corrosion resistant to seawater and should be tested in accordance with ISO 9227:1990 for a period of 96 h.</p> <p>Metal components should not affect a magnetic compass of a type used in small boats by more than 1 degree, when placed at a distance of 500 mm from it.</p>	<p>Weight of sand bag _____ Kg.  Area of Sand bag _____ mm  Drop Height _____ mm  Drop Time _____ sec  No. of Drops _____  Length of test _____ hr.</p> <p>Passed _____      Failed _____</p> <p>Comments/Observations</p>
2.2.2.9.5 <b>Test of metallic components</b>	<b>Regulations: LSA Code; MSC.81(70) 1/2.11.4.6</b>
Test Procedure	Acceptance Criteria
<p>Metal parts and components of a lifejacket should be corrosion resistant to seawater and should be tested in accordance with ISO 9227:1990 for a period of 96 h.</p> <p>Metal components should not affect a magnetic compass of a type used in small boats by more than 1 degree, when placed at a distance of 500 mm from it.</p>	<p>The metal components should be inspected and should not be significantly affected by corrosion, or effect any other parts of the lifejacket and should not impair the performance of the lifejacket.</p> <p>The lifejacket should not effect the magnetic compass by more than 1°.</p>
Test Procedure	Significant Test Data
<p>Metal parts and components of a lifejacket should be corrosion resistant to seawater and should be tested in accordance with ISO 9227:1990 for a period of 96 h.</p> <p>Metal components should not affect a magnetic compass of a type used in small boats by more than 1 degree, when placed at a distance of 500 mm from it.</p>	<p>1.      Corrosion Test on Components.</p> <p>Passed _____      Failed _____</p> <p>2.      Magnetic Test on Components.</p> <p>Passed _____      Failed _____</p> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

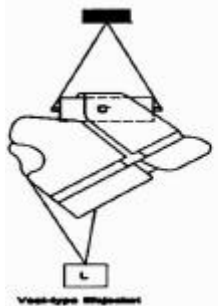
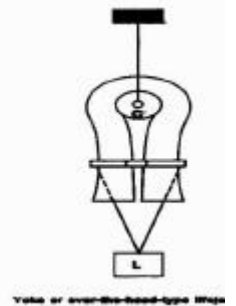
2.2.2.9.6 Inadvertent inflation test		Regulations: LSA Code; MSC.81(70) 1/2.11.4.7
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The resistance of an automatic inflation device to inadvertent operation should be assessed by exposing the entire lifejacket to sprays of water for fixed period.</p> <p>The lifejacket should be fitted correctly to a free standing manikin of adult size, with a minimum shoulder height of 1500 mm. The lifejacket should be deployed in the mode in which it is worn ready for use but not deployed as used in the water (i.e. if it is equipped with a cover which is normally worn closed, then the cover should be closed for the test).</p> <p>Two sprays should be installed so as to spray fresh water onto the lifejacket, as shown in the diagram. One should be positioned 500 mm above the highest point of the lifejacket, and at an angle of 15° from the vertical centre line of the manikin and the bottom line of the lifejacket. The other nozzle should be installed horizontally at a distance of 500 mm from the bottom line of the lifejacket, and points directly at the lifejacket. These nozzles should have a spray cone of 30°, each orifice being 1.5 ± 0.1 mm in diameter, and the total area of the orifice should be 50 ± 5 mm², the orifice being evenly spread over the spray nozzle area.</p> <p>The air temperature should be 20°C, and water should be supplied to the sprays at a pressure of 0.3 kPa - 0.4 kPa, a flow of 600 l/h, and at a temperature of 18°C to 20°C.</p>		<p>1. Inadvertent Inflation.</p> <p>Passed _____ Failed _____</p> <p>2. Auto inflation test.</p> <p>Auto inflation system operable.</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.9.6 Inadvertent inflation test (continued)	Regulations: LSA Code; MSC.81(70) 1/2.11.4.7	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The sprays should be turned on, and the lifejacket exposed to the following series of test to access the ability of the jacket to resist inadvertent inflation:</p> <ol style="list-style-type: none"> <li>.1) 5 minutes with the high spray on the front of the lifejacket;</li> <li>.2) 5 minutes with the high spray on the left side of the lifejacket;</li> <li>.3) 5 minutes with the high spray on the back of the lifejacket; and</li> <li>.4) 5 minutes with the high spray on the right side of the lifejacket.</li> </ol> <p>During exposures .1), .2) and .4) the horizontal spray should be applied for 10 periods of 3 sec each to the front, left or right sides (but not back) as with the high spray.</p> <div style="text-align: center;">  </div> <p>Test set-up for test of automatic inflation system</p>	<p>The lifejacket should not inflate during the test</p> <p>After completing this test the lifejacket should be immersed in water to verify that the auto-inflation system is working.</p> <p style="margin-top: 20px;">Alternative former</p> <div style="text-align: center;">  </div>	<ol style="list-style-type: none"> <li>1. Inadvertent Inflation. Passed _____ Failed _____</li> <li>2. Auto inflation test. Auto inflation system operable. Time to inflate: _____ sec. Passed _____ Failed _____</li> </ol> <p>Comments/Observations</p>

[illegible]

<b>Inflatable Lifejackets</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.2.11 Shoulder strength test		Regulations: LSA Code; MSC.81(70) 1/2.6.2
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One inflatable lifejacket subjected to the tests in 2.2.2.5, 2.2.2.6, 2.2.2.7, 2.2.2.8 and 2.2.2.10 above should be subjected to the shoulder strength test.</p> <p>The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed in the same manner as when it is worn by a person. A force of not less than 900 N (700 N in the case of a child-size lifejacket) should be applied for 30 min to the shoulder section of the lifejacket. (see figure below).</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>Shoulder strength test arrangement for lifejackets</p> <p>C - Cylinder      125 mm for adult sizes                          50 mm for child-sizes</p> <p>L - Test load</p>	<p>The lifejacket should not be damaged as a result of this test.</p>	<p>Force applied _____N</p> <p>Time force applied _____min</p> <p>Sign of damage</p> <p>Passed _____                      Failed</p> <p>Comments/Observations</p>

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.12 Donning test (Uninflated situation)		Regulations: LSA Code II/2.2.1.2.; MSC.81(70) 1/2.8.2.																		
Test Procedure		Acceptance Criteria		Significant Test Data																
<p>The test should be carried out with at least six able-bodied persons of the following heights and weights:</p> <table><tr><th>Height</th><th>Weight</th></tr><tr><td>1.40m - 1.60m;</td><td>1 person under 60kg</td></tr><tr><td></td><td>1 person over 60kg</td></tr><tr><td>1.60m - 1.80m</td><td>1 person under 70kg</td></tr><tr><td></td><td>1 person over 70kg</td></tr><tr><td>over 1.80m</td><td>1 person under 80kg</td></tr><tr><td></td><td>1 person over 80kg</td></tr></table> <p>Each test subject should be tested wearing normal clothing</p> <p>The test should be carried out in uninflated condition.</p> <p>The test should be repeated with the test subject wearing heavy-weather clothing.</p> <p>The observer should note :</p> <div><div>.1</div>ease and speed of donning;</div> <div><div>.2</div>proper fit and adjustment; and</div> <div><div>.3</div>that the lifejacket has been put on correctly.</div>		Height	Weight	1.40m - 1.60m;	1 person under 60kg		1 person over 60kg	1.60m - 1.80m	1 person under 70kg		1 person over 70kg	over 1.80m	1 person under 80kg		1 person over 80kg	<p>Ties and fastenings necessary for proper performance should be few and simple. Lifejackets should readily fit various sizes of adults, both lightly and heavily clad. Lifejackets should be capable of being worn inside-out, or clearly in only one way.</p> <p>At least 75% of the test subjects who are completely unfamiliar with the lifejacket should be able to done it within 1 min without assistance, guidance or prior demonstration.</p> <p>After demonstration, the test subjects should correctly don lifejackets within a period of 1 min without assistance.</p>		Male/Female      Height      Weight		
		Height	Weight																	
		1.40m - 1.60m;	1 person under 60kg																	
			1 person over 60kg																	
		1.60m - 1.80m	1 person under 70kg																	
			1 person over 70kg																	
		over 1.80m	1 person under 80kg																	
			1 person over 80kg																	
		Subject No.1																		
		Subject No.2																		
Subject No.3																				
Subject No.4																				
Subject No.5																				
Subject No.6																				
<u>Donning time with normal clothing</u>																				
Time      Passed      Failed																				
Subject No.1																				
Subject No.2																				
Subject No.3																				
Subject No.4																				
Subject No.5																				
Subject No.6																				
Proper fit and adjustment with normal clothing.																				
Time      Passed      Failed																				
Subject No.1																				
Subject No.2																				
Subject No.3																				
Subject No.4																				
Subject No.5																				
Subject No.6																				
<u>Donning time with heavy weather clothing</u>																				
Time      Passed      Failed																				
Subject No.1																				
Subject No.2																				
Subject No.3																				
Subject No.4																				
Subject No.5																				
Subject No.6																				
Comments/Observations																				

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.13 Donning test (Inflated situation)		Regulations: LSA Code II/2.2.1.2; MSC.81(70) 1/2.8.2			
Test Procedure	Acceptance Criteria	Significant Test Data			
<p>Each test subject should be tested wearing normal clothing.</p> <p>The test should be carried out in inflated condition.</p> <p>The test should be repeated with the test subject wearing heavy-weather clothing.</p> <p>The observer should note :</p> <div><div>.1</div>ease and speed of donning;</div> <div><div>.2</div>proper fit and adjustment; and</div> <div><div>.3</div>that the lifejacket has been put on correctly.</div>	<p>Ties and fastenings necessary for proper performance should be few and simple. Lifejackets should readily fit various sizes of adults, both lightly and heavily clad. Lifejackets should be capable of being worn inside-out, or clearly in only one way.</p> <p>At least 75% of the test subjects who are completely unfamiliar with the lifejacket should be able to done it within 1 min without assistance, guidance or prior demonstration.</p> <p>After demonstration, the test subjects should correctly don lifejackets within a period of 1 min without assistance.</p>	Are test subjects same as for 2.2.2.12?			
		<u>Donning time with normal clothing</u>			
		Time	Passed	Failed	
		Subject No.1	_____ sec	_____	_____
		Subject No.2	_____ sec	_____	_____
		Subject No.3	_____ sec	_____	_____
		Subject No.4	_____ sec	_____	_____
		Subject No.5	_____ sec	_____	_____
		Subject No.6	_____ sec	_____	_____
		Proper fit and adjustment with normal clothing.			
Time	Passed	Failed			
Subject No.1	_____ sec	_____	_____		
Subject No.2	_____ sec	_____	_____		
Subject No.3	_____ sec	_____	_____		
Subject No.4	_____ sec	_____	_____		
Subject No.5	_____ sec	_____	_____		
Subject No.6	_____ sec	_____	_____		
<u>Donning time with heavy weather clothing</u>					
Time	Passed	Failed			
Subject No.1	_____ sec	_____	_____		
Subject No.2	_____ sec	_____	_____		
Subject No.3	_____ sec	_____	_____		
Subject No.4	_____ sec	_____	_____		
Subject No.5	_____ sec	_____	_____		
Subject No.6	_____ sec	_____	_____		
Comments/Observations					



<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.14 Preparation for water performance tests	Regulations: LSA Code II/2.2.1.3; MSC.81(70) 1/2.9.4 - .5; 2.11.3																																																																																				
Test Procedure	Acceptance Criteria																																																																																				
<p><u>Preparations for water performance tests:</u></p> <p>This portion of the test is intended to determine the ability of the lifejacket to assist a helpless person or one in an exhausted or unconscious state and to show that the lifejacket does not unduly restrict movement.</p> <p>All tests should be carried out in fresh water under still conditions.</p> <p>The test subjects should wear only swimming costumes.</p> <p>These tests should be carried out with at least six persons as mentioned in paragraph 2.2.2.12.</p> <p>Each test subject should be made familiar with each of the tests in 2.2.15 and 2.2.16, particularly the requirements regarding relaxing and exhaling in the face-down position.</p> <p>The test subjects should don the lifejacket, unassisted, using only the instructions provided by the manufacturer. The observer should note ease and speed of donning, and proper fit and adjustment.</p> <p>Only good swimmers should be used, since the ability to relax in the water is rarely otherwise obtained.</p>	<p>When evaluating the results of a test in accordance with (righting test, freeboard and face plan tests the Administration may, in exceptional circumstances, disregard the results of a test on a subject if the results show a very slight deviation from the specified criteria, provided the Administration is satisfied that the deviation can be attributed to the unusual size and stature characteristics of the test subject and the results of tests on other subjects, chosen in accordance with the test subjects requirements, show the satisfactory performance of the lifejacket.</p>																																																																																				
	<p>Are test subjects same as in 2.2.2.12?</p> <p>If not, describe test subjects:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Male/Female</th> <th style="width: 10%; text-align: center;">Height</th> <th style="width: 20%; text-align: center;">Weight</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> </tbody> </table> <p>Donning time</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Time</th> <th style="width: 10%; text-align: center;">Passed</th> <th style="width: 20%; text-align: center;">Failed</th> </tr> </thead> <tbody> <tr><td>Subject No. 1</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 2</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 3</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 4</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 5</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 6</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> </tbody> </table> <p>Proper fit and adjustment</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%;"></th> <th style="width: 10%; text-align: center;">Passed</th> <th style="width: 20%; text-align: center;">Failed</th> </tr> </thead> <tbody> <tr><td>Subject No. 1</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 2</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 3</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 4</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 5</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No. 6</td><td style="text-align: center;">_____ sec.</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> </tbody> </table> <p>Comments/Observations</p>		Male/Female	Height	Weight	Subject No.1	_____	_____	_____	Subject No.2	_____	_____	_____	Subject No.3	_____	_____	_____	Subject No.4	_____	_____	_____	Subject No.5	_____	_____	_____	Subject No.6	_____	_____	_____		Time	Passed	Failed	Subject No. 1	_____ sec.	_____	_____	Subject No. 2	_____ sec.	_____	_____	Subject No. 3	_____ sec.	_____	_____	Subject No. 4	_____ sec.	_____	_____	Subject No. 5	_____ sec.	_____	_____	Subject No. 6	_____ sec.	_____	_____			Passed	Failed	Subject No. 1	_____ sec.	_____	_____	Subject No. 2	_____ sec.	_____	_____	Subject No. 3	_____ sec.	_____	_____	Subject No. 4	_____ sec.	_____	_____	Subject No. 5	_____ sec.	_____	_____	Subject No. 6	_____ sec.	_____	_____
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<b>Inflatable Lifejackets</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.2.15Water performance tests – Righting test		Regulations: LSA Code II/2.2.1.3.2; MSC.81(70) 1/2.9..5						
Test Procedure		Acceptance Criteria		Significant Test Data				
<p>The test subject should swim at least three gentle strokes (breaststroke)and then with minimum headway relax, with head down and the lungs partially filled, simulating a state of utter exhaustion. The period of time should be recorded starting from the completion of the last stroke until the mouth of the test subject comes clear of the water. The above test should be repeated after the test subject has exhaled. The time should again be ascertained as above.</p> <p>The freeboard to the mouth, trunk angle and faceplane angle should be recorded after the test subject comes to rest.</p> <p>The test should be conducted using lifejackets that have been inflated both automatically and manually, and also with one of the compartments uninflated. The tests with one of the compartments uninflated should be repeated as many times as necessary to perform the test once with each compartment in the uninflated condition.</p>		<p>The test subject should come to rest with the mouth clear of the water by at least 120 mm. The average of all subjects’ trunk angles should be at least 30° back of vertical, and each individual subject’s angle should be at least 20° back of vertical. The average of all subjects’ faceplane (head) angles should be at least 40° above horizontal, and each individual subject’s angle should be at least 30° above horizontal. The mouth should be clear of the water in not more than 5 sec. The lifejacket should not become dislodged or cause harm to the test subject.</p> <p>The Administration may, in exceptional circumstances, disregard the results of a test on a subject if the results show a very slight deviation from the specified criteria, provided the Administration is satisfied that the deviation can be attributed to the unusual size and stature characteristics of the test subject and the results of tests on other subjects show the satisfactory performance of the lifejacket. Explain under comments/observations.</p>		Are test subjects same as in 2.2.2.12?				
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2.2.2.15 Water performance tests - Righting test (continued)	Regulations: LSA Code II/2.2.1.3.2; MSC.81(70) 1/2.9.5																																																																																																																																																
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	Lot/Serial Number: _____		Organization: _____

2.2.2.16 Water performance tests - Drop test		Regulations: LSA Code II/2.2.1.3; MSC.81(70) 1/2.9.4 - .5		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Without readjusting the lifejacket, the test subject should jump vertically into the water, feet first, from a height of at least 4.5 m. When jumping into the water, the test subject should be allowed to hold on to the lifejacket during water entry to avoid possible injury. The freeboard to the mouth should be recorded after the test subject comes to rest.</p> <p>The freeboard to the mouth, trunk angle and faceplane angle should be recorded after the test subject comes to rest</p> <p>The test should be conducted using lifejackets that have been inflated both automatically and manually, and also with one of the compartments uninflated. The tests with one of the compartments uninflated should be repeated as many times as necessary to perform the test once with each compartment in the uninflated condition.</p>	<p>The test subject should come to rest with the mouth clear of the water by at least 120 mm. The average of all subjects’ trunk angles should be at least 30° back of vertical, and each individual subject’s angle should be at least 20° back of vertical. The average of all subjects’ faceplane (head) angles should be at least 40° above horizontal, and each individual subject’s angle should be at least 30° above horizontal. The lifejacket should not become dislodged or cause harm to the test subject.</p> <p>The Administration may, in exceptional circumstances, disregard the results of a test on a subject if the results show a very slight deviation from the specified criteria, provided the Administration is satisfied that the deviation can be attributed to the unusual size and stature characteristics of the test subject and the results of tests on other subjects show the satisfactory performance of the lifejacket. Explain under comments/observations.</p>			

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2.2.2.16 Water performance tests – Drop test (continued)	Regulations: LSA Code II/2.2.1.3; MSC.81(70) 1/2.9.4 - .5																																																																																																								
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	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 15%; text-align: center;">Freeboard (mm)</th> <th style="width: 15%; text-align: center;">Trunk Angle (deg.)</th> <th style="width: 10%; text-align: center;">Faceplane Angle (deg.)</th> </tr> </thead> <tbody> <tr> <td colspan="4"><b>Subject No.5</b></td> </tr> <tr> <td colspan="4"><b>Manual inflated</b></td> </tr> <tr> <td colspan="4"><b>Auto inflated</b></td> </tr> <tr> <td>With chamber 1</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>With chamber 2</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>With chamber 3</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>With chamber 4</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td colspan="4"><b>Subject No.6</b></td> </tr> <tr> <td colspan="4"><b>Manual inflated</b></td> </tr> <tr> <td colspan="4"><b>Auto inflated</b></td> </tr> <tr> <td>With chamber 1</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>With chamber 2</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>With chamber 3</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>With chamber 4</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td colspan="4">Minimum individual freeboard _____ mm</td> </tr> <tr> <td colspan="4">Minimum individual trunk angle: _____ Deg.</td> </tr> <tr> <td colspan="4">Average trunk angles, all subjects: _____ Deg</td> </tr> <tr> <td colspan="4">Minimum individual face plane (head) angle: _____ Deg</td> </tr> <tr> <td colspan="4">Average faceplane (head) angle, all subjects: _____ Deg</td> </tr> <tr> <td colspan="4">Did the lifejacket become dislodged or cause harm to the test subject? _____</td> </tr> <tr> <td colspan="4">Did the light become detached or dislodged?: _____</td> </tr> <tr> <td colspan="4">Is the position of the light in accordance with the LSA Code?: _____</td> </tr> <tr> <td colspan="4">Is the retro reflective tape correctly fitted?: _____</td> </tr> <tr> <td colspan="4">Passed _____ Failed _____</td> </tr> <tr> <td colspan="4">Comments/observations:</td> </tr> </tbody> </table>		Freeboard (mm)	Trunk Angle (deg.)	Faceplane Angle (deg.)	<b>Subject No.5</b>				<b>Manual inflated</b>				<b>Auto inflated</b>				With chamber 1	_____	_____	_____	With chamber 2	_____	_____	_____	With chamber 3	_____	_____	_____	With chamber 4	_____	_____	_____	<b>Subject No.6</b>				<b>Manual inflated</b>				<b>Auto inflated</b>				With chamber 1	_____	_____	_____	With chamber 2	_____	_____	_____	With chamber 3	_____	_____	_____	With chamber 4	_____	_____	_____	Minimum individual freeboard _____ mm				Minimum individual trunk angle: _____ Deg.				Average trunk angles, all subjects: _____ Deg				Minimum individual face plane (head) angle: _____ Deg				Average faceplane (head) angle, all subjects: _____ Deg				Did the lifejacket become dislodged or cause harm to the test subject? _____				Did the light become detached or dislodged?: _____				Is the position of the light in accordance with the LSA Code?: _____				Is the retro reflective tape correctly fitted?: _____				Passed _____ Failed _____				Comments/observations:			
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<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

2.2.2.17Swimming and water emergence test		Regulations: LSA Code II/2.2.1.4; MSC.81(70) 1/2.9.9	
Test Procedure	Acceptance Criteria	Significant Test Data	
All test subjects, without wearing the lifejacket, should attempt to swim 25 m and board a liferaft or rigid platform with its surface 300 mm above the water surface. All test subjects who successfully complete this task should perform it again wearing the lifejacket.	At least two-thirds of the subjects who can accomplish the task without the lifejacket should also be able to perform it with the lifejacket.	1)	25m swim and boarding without lifejacket.
			PassFail
			Subject No.1
			Subject No.2
			Subject No.3
			Subject No.4
			Subject No.5
			Subject No.6
		2)	25 m swim and boarding with lifejacket.
			PassFail
	Subject No.1		
	Subject No.2		
	Subject No.3		
	Subject No.4		
	Subject No.5		
	Subject No.6		
		Could at least two thirds of the subjects who could accomplish the task without a lifejacket also perform it with the lifejacket?	
		Passed _____Failed _____	
		Apparatus used:	
		Comments/Observations	

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.18 Children's lifejacket - Test subjects		Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.1 – 2.10.2																																																						
Test Procedure	Acceptance Criteria		Significant Test Data																																																					
<p>Test subjects should be selected to fully represent the range of sizes for which the device is to be approved. Devices for smaller children should be tested on children as small as approximately 760mm tall and 9kg mass. At least six test subjects should be used for each 380mm and 16 kg of size range.</p> <p><u>Preparations for water performance tests.</u></p> <p>1. Subjects should wear only swimming costumes;</p> <p>2. As far as practical, only good swimmers who can relax in the water should be used;</p> <p>3. The test subjects should be made familiar with each of the tests set out below and the requirement to relax and exhale while face-down; and</p> <p>4. All tests should be carried out in fresh water under still conditions.</p> <p>Note: Water tests using children should avoid causing distress or risk to the child. Consideration should be taken of their age and ability.</p>	<table><tr><th>Height</th><th>Weight</th><th></th></tr><tr><td>0.76 m to 1.14 m;</td><td>9 kg to 25 kg</td><td>at least 6 persons</td></tr><tr><td>1.14 m to 1.52 m;</td><td>25 kg to 41 kg</td><td>at least 6 persons</td></tr><tr><td>over 1.52 m</td><td>41 kg to 57 kg</td><td>at least 6 persons</td></tr></table>	Height	Weight		0.76 m to 1.14 m;	9 kg to 25 kg	at least 6 persons	1.14 m to 1.52 m;	25 kg to 41 kg	at least 6 persons	over 1.52 m	41 kg to 57 kg	at least 6 persons	<p>Check the format on the test subjects table.....</p> <p>Same comments as for the above tests apply to children's lifejackets.</p> <p>1) Height: 0.76m to 1.14m &amp; Weight: 9kg to 25kg.</p> <table><tr><th>Height</th><th>Weight</th></tr><tr><td>Subject No.1</td><td></td></tr><tr><td>Subject No.2</td><td></td></tr><tr><td>Subject No.3</td><td></td></tr><tr><td>Subject No.4</td><td></td></tr><tr><td>Subject No.5</td><td></td></tr><tr><td>Subject No.6</td><td></td></tr></table> <p>2) Height: 1.14m to 1.52m &amp; Weight: 25kg to 41kg.</p> <table><tr><th>Height</th><th>Weight</th></tr><tr><td>Subject No.7</td><td></td></tr><tr><td>Subject No.8</td><td></td></tr><tr><td>Subject No.9</td><td></td></tr><tr><td>Subject No.10</td><td></td></tr><tr><td>Subject No.11</td><td></td></tr><tr><td>Subject No.12</td><td></td></tr></table> <p>3) Height: 1.52 m to 1.9 m &amp; Weight: 41kg to 57kg.</p> <table><tr><th>Height</th><th>Weight</th></tr><tr><td>Subject No.13</td><td></td></tr><tr><td>Subject No.14</td><td></td></tr><tr><td>Subject No.15</td><td></td></tr><tr><td>Subject No.16</td><td></td></tr><tr><td>Subject No.17</td><td></td></tr><tr><td>Subject No.18</td><td></td></tr></table> <p>Comments/Observations</p>	Height	Weight	Subject No.1		Subject No.2		Subject No.3		Subject No.4		Subject No.5		Subject No.6		Height	Weight	Subject No.7		Subject No.8		Subject No.9		Subject No.10		Subject No.11		Subject No.12		Height	Weight	Subject No.13		Subject No.14		Subject No.15		Subject No.16		Subject No.17		Subject No.18	
	Height	Weight																																																						
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<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.19 Children's lifejacket tests - Water performance tests - Righting test		Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.2.1				
Test Procedure	Acceptance Criteria	Significant Test Data				
<p>The test subject should swim at least three gentle strokes (breaststroke) and then with minimum headway relax, with head down and the lungs partially filled, simulating a state of utter exhaustion. The test should be repeated after the test subject has exhaled.</p> <p>Record time from completion of last stroke until mouth comes clear of the water</p> <p>The freeboard to the mouth, trunk angle, and faceplane angle should be recorded after the test subject comes to rest.</p>	<p>Child-size lifejackets should meet the following requirements for their critical flotation stability characteristics.</p> <p>Turning time. Each individual subject must turn face-up in not more than 5 s.</p> <p>The combined results for clearance above the water for all subjects should average at least 90 mm; each individual subject under 1270 mm and 23 kg should have at least 50 mm clearance, and each individual subject over 1270 mm and 23 kg should have at least 75 mm clearance.</p> <p>The average of all subjects’ trunk angles should be at least 40° back of vertical, and each individual’s result should be at least 20° back of vertical.</p> <p>The average of all subjects’ faceplane (head) angles should be at least 35° above horizontal, and each individual subject’s result should be at least 20° above horizontal.</p>	Test subjects same as in 2.2.2.18?				
		Turning time 1	Turning time 2	Freeboard	Trunk Angle	Head angle
		sec	sec	mm	degrees	degrees
		Subj.No.1				
		Subj.No.2				
		Subj.No.3				
		Subj.No.4				
		Subj.No.5				
		Subj.No.6				
		Subj.No.7				
		Subj.No.8				
		Subj.No.9				
		Subj.No.10				
		Subj.No.11				
		Subj.No.12				
		Subj.No.13				
		Subj.No.14				
		Subj.No.15				
		Subj.No.16				
		Subj.No.17				
Subj.No.18						
		Slowest turn time: _____ sec Average freeboard, all subjects: _____ mm				
		Minimum freeboard subjects < 1.27m and 23 kg: _____ mm				
		Minimum freeboard subjects > 1.27m and 23 kg: _____ mm				
		Minimum individual trunk angle: _____ Deg.				
		Average trunk angles, all subjects: _____ Deg				
		Minimum individual face plane (head) angle: _____ Deg				
		Average faceplane (head) angle, all subjects: _____ Deg				
		Allowable range in height and weight based on test data: _____m, _____ kg				
		Meets all criteria for allowable range: Passed <input type="checkbox"/> Failed <input type="checkbox"/>				



<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.20 Children's lifejacket tests - Water performance tests – Drop test	Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.2.1																																																																															
Test Procedure	Acceptance Criteria	Significant Test Data																																																																														
<p>Without readjusting the lifejacket, the test subject should jump vertically into the water, feet first, from a height of at least 4.5 m.</p> <p>When jumping into the water, the test subject should be allowed to hold on to the lifejacket during water entry to avoid possible injury.</p> <p>The freeboard to the mouth, trunk angle, and faceplane angle should be recorded after the test subject comes to rest</p>	<p>Child-size lifejackets should meet the following requirements for their critical flotation stability characteristics.</p> <p>The combined results for clearance above the water for all subjects should average at least 90 mm; each individual subject under 1270 mm and 23 kg should have at least 50 mm clearance, and each individual subject over 1270 mm and 23 kg should have at least 75 mm clearance.</p> <p>The average of all subjects' trunk angles should be at least 40° back of vertical, and each individual's result should be at least 20° back of vertical.</p> <p>The average of all subjects' faceplane (head) angles should be at least 35° above horizontal, and each individual subject's result should be at least 20° above horizontal.</p>	<p>Test subjects same as in 2.2.2.18?</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 20%; text-align: center;">Freeboard mm</th> <th style="width: 20%; text-align: center;">Trunk Angle degrees</th> <th style="width: 20%; text-align: center;">Head angle degrees</th> </tr> </thead> <tbody> <tr><td>Subj.No.1</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.2</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.3</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.4</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.5</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.6</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.7</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.8</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.9</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.10</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.11</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.12</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.13</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.14</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.15</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.16</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.17</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subj.No.18</td><td>_____</td><td>_____</td><td>_____</td></tr> </tbody> </table> <p>Minimum freeboard subjects &lt; 1.27m and 23 kg: _____ mm  Minimum freeboard subjects &gt; 1.27m and 23 kg: _____ mm</p> <p>Minimum individual trunk angle: _____ Deg.  Average trunk angles, all subjects: _____ Deg</p> <p>Minimum individual face plane (head) angle: _____ Deg  Average faceplane (head) angle, all subjects: _____ Deg</p> <p>Allowable range in height and weight based on test data: _____m, _____ kg  Meets all criteria for allowable range:      Passed <input type="checkbox"/>      Failed <input type="checkbox"/></p>				Freeboard mm	Trunk Angle degrees	Head angle degrees	Subj.No.1	_____	_____	_____	Subj.No.2	_____	_____	_____	Subj.No.3	_____	_____	_____	Subj.No.4	_____	_____	_____	Subj.No.5	_____	_____	_____	Subj.No.6	_____	_____	_____	Subj.No.7	_____	_____	_____	Subj.No.8	_____	_____	_____	Subj.No.9	_____	_____	_____	Subj.No.10	_____	_____	_____	Subj.No.11	_____	_____	_____	Subj.No.12	_____	_____	_____	Subj.No.13	_____	_____	_____	Subj.No.14	_____	_____	_____	Subj.No.15	_____	_____	_____	Subj.No.16	_____	_____	_____	Subj.No.17	_____	_____	_____	Subj.No.18	_____	_____	_____
	Freeboard mm	Trunk Angle degrees	Head angle degrees																																																																													
Subj.No.1	_____	_____	_____																																																																													
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Subj.No.16	_____	_____	_____																																																																													
Subj.No.17	_____	_____	_____																																																																													
Subj.No.18	_____	_____	_____																																																																													

<b>Inflatable Lifejackets</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.2.21 Children's lifejacket mobility test		Regulations: LSA Code II/2.2.1.5; MSC.81(70) 1/2.10.2.5			
Test Procedure		Acceptance Criteria		Significant Test Data	
Mobility of the subject both in and out of the water should be given consideration in determining the acceptability of a device for approval.				Does the lifejacket provide for acceptable mobility of the test subjects both in and out of the water?  YES <input type="checkbox"/> NO <input type="checkbox"/>  Passed _____ Failed _____ Method of evaluation:   <	

## **2.2.3 LIFEJACKET/IMMERSION SUIT LIGHTS**

### **EVALUATION AND TEST REPORT**

**Remarks:** If an immersion suit is designed to be worn without a lifejacket, it should be fitted with a light complying with the requirements for lifejacket lights.

**The immersion suit light should be treated as a lifejacket light.**

- 2.2.3.0 General Information
  - 2.2.3.0.1 General Data and Specifications
  - 2.2.3.0.2 Submitted drawings, reports and documents
- 2.2.3.1 Visual Inspection
  - 2.2.3.1.1 Approval Marking
  - 2.2.3.1.2 Expiry Marking
  - 2.2.3.1.3 Additional Markings
  - 2.2.3.1.4 Electrical Short Circuit Protection
  - 2.2.3.1.5 Visibility when attached to a Lifejacket
  - 2.2.3.1.6 Construction and Materials
- 2.2.3.2 Temperature Cycling Test
- 2.2.3.3 Light Tests
- 2.2.3.4 Chromaticity Test
- 2.2.3.5 Drop Test
- 2.2.3.6 2 m Light Drop Test
- 2.2.3.7 Switch Arrangement Test
- 2.2.3.8 Vibration Test
- 2.2.3.9 Mould Growth Test
- 2.2.3.10 Corrosion and Seawater Resistance Test
- 2.2.3.11 Test for Oil Resistance
- 2.2.3.12 Rain Test and Watertightness Test
- 2.2.3.13 Fire Test

**2.2.3 LIFEJACKET/IMMERSION SUIT LIGHTS**  
**EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.3.0.1 General Data and Specifications		Regulations: LSA Code; MSC.81(70)
General Information	Lifejacket Light Dimensions	Lifejacket Light Weight
TYPE OF SWITCHING: Automatic Manual  FLASHING LIGHT  STEADY LIGHT		Comments/Observations

<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.2.3.0.2 Submitted drawings, reports and documents</b>
--

Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.1 Visual Inspection	Regulations: LSA Code 1.2.2.1/1.2.2.9/1.2.2.10/1.2.3/2.2.3.1.3																
Test Procedure	Acceptance Criteria																
<p>Twenty lifejacket lights should be examined in detail for the following items :</p> <p>Approval marking</p> <p>Expiry marking</p> <p>Additional markings</p>	<p>The lifejacket lights should :</p> <ul style="list-style-type: none"> <li>- be clearly marked with approval information including the Administration which approved it, and any operational restrictions;</li> <li>- be marked with a date of expiry;</li> </ul> <p>The Administration should determine the</p> <ul style="list-style-type: none"> <li>- period of acceptability, due to deterioration with age. The established life must be justified by the manufacturer</li> </ul> <p>Be provided with the following information :</p> <ul style="list-style-type: none"> <li>- precise definition of intended use (e.g. "Lifejacket light");</li> <li>serial number;</li> <li>identification of the manufacturer;</li> <li>easily understandable symbols for on/off switching;</li> <li>where applicable, information on proper battery disposal by the words : "DO NOT INCINERATE / DO NOT RECHARGE / DO NOT TAMPER";</li> </ul>																
	<p><u>Results:</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">PASS:</td><td style="width: 50%;">FAIL:</td></tr> <tr> <td>PASS:</td><td>FAIL:</td></tr> </table> <p><u>Results:</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">PASS:</td><td style="width: 50%;">FAIL:</td></tr> </table> <p><u>Results:</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">PASS:</td><td style="width: 50%;">FAIL:</td></tr> <tr> <td>PASS:</td><td>FAIL:</td></tr> <tr> <td>PASS:</td><td>FAIL:</td></tr> <tr> <td>PASS:</td><td>FAIL:</td></tr> <tr> <td>PASS:</td><td>FAIL:</td></tr> </table> <p>Comments/Observations</p>	PASS:	FAIL:	PASS:	FAIL:	PASS:	FAIL:	PASS:	FAIL:	PASS:	FAIL:	PASS:	FAIL:	PASS:	FAIL:	PASS:	FAIL:
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<b>Lifejacket Lights</b>	Manufacturer:_____ Date:_____ Time:_____
	Model:_____ Surveyor:_____
	Lot/Serial Number:_____ Organization:_____

<b>2.2.3.1</b>	<b>Visual Inspection (continued)</b>	<b>Regulations: LSA Code 1.2.2.1/1.2.2.9/1.2.2.10/1.2.3/2.2.3.1.3</b>	
Test Procedure		Acceptance Criteria	Significant Test Data
		The lifejacket lights should :	<u>Results:</u>
Electrical short circuit protection	- be provided with electrical short circuit protection to prevent damage or injury;	PASS:	FAIL:
Visibility when attached to a lifejacket	- be visible over as great a segment of the upper hemisphere as is practicable when attached to a lifejacket;	PASS:	FAIL:
Construction and materials	- be constructed with proper workmanship and materials; and	PASS:	FAIL:
	- if the light is a flashing light, be provided with a manually operated switch.	PASS:	FAIL:
		Comments/Observations	



Lot/Serial Number: \_\_\_\_\_ Organization: \_\_\_\_\_

### 2.2.3.1 VISUAL INSPECTION

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.2 Temperature Cycling Test	Regulations: LSA Code 1.2.2.2; MSC.81(70) 1/1.2/1.2.1/1.2.2/10.3/10.3.1/10.3.2
Test Procedure	Acceptance Criteria
<p>Twelve lifejacket lights which have passed the visual inspection should be subjected to temperature cycling. The following test should be carried out on twelve lifejacket lights :</p> <p>The lifejacket lights should be alternately subjected to surrounding temperatures of not less than -30<sup>0</sup>C and at least +65<sup>0</sup>C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of not less than 10 cycles, is acceptable :</p> <ol style="list-style-type: none"> <li>1. at least an 8 h cycle at not less than +65<sup>0</sup>C to be completed in one day; and</li> <li>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</li> <li>3. at least an 8 h cycle at not less than 30<sup>0</sup>C to be completed the next day; and</li> <li>4. the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.</li> </ol> <p>After having passed the temperature cycling test the lights should be subjected next to the light tests.</p>	<p>The lifejacket lights should not be damaged in stowage throughout the air temperature range of at least -30<sup>0</sup>C to +65<sup>0</sup>C.</p> <p>The lifejacket lights should show no sign of loss of rigidity under high temperatures and, after the tests, should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should function after the test.</p>
	<p style="text-align: center;"><b>Significant Test Data</b></p> <p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Attach temperature cycling chart to record times spent at each temperature.</p> <p>Comments/Observations</p>

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.2	Temperature cycling test – Test data	Regulations: LSA Code 1.2.2.2; MSC.81(70) 1/ 1.2/1.2.1/1.2.2/10.3/10.3.1/10.3.2		
	<i><b>HOT CYCLE</b></i>	<i><b>COLD CYCLE</b></i>		
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.3Light Tests		Regulations: LSA Code 1.2.2.3/2.2.3.1.1/2.2.3.1.2/2.2.3.2.2; MSC.81(70) 1/ 10.3.2/10.3.5/10.3.5.2/10.3.5.3/10.4/10.4.9	
Test Procedure	Acceptance Criteria	Significant Test Data	
<p>Four lifejacket lights which have passed the temperature cycling test should be taken from a stowage temperature of -30<sup>0</sup>C and then be operated immersed in seawater at a temperature of -1<sup>0</sup>C, four lifejacket lights which have passed the temperature cycling test should be taken from a stowage temperature of +65<sup>0</sup>C and be operated immersed in seawater at a temperature of +30<sup>0</sup>C, and four lifejacket lights which have passed the temperature cycling test should be taken from ordinary room conditions and be operated immersed in freshwater at ambient temperature.</p> <p>If the voltage at 5 min of operation is lower than the recorded voltage at the end of life it is permissible to use a lamp from the same build standard for the light output test. Using the lowest recorded voltage a light output test can be carried out as described below. The voltage of all 12 test units should be monitored continuously for 8 h. To make sure that all test units provide a luminous intensity of not less than 0.75 cd in all directions of the upper hemisphere for 8 h operation, the following test should be performed.</p>	<p>Water-activated lifejacket lights should commence functioning within 2 min and have reached a luminous intensity of not less than 0.75 cd within 5 min in seawater. In freshwater a luminous intensity of not less than 0.75 cd should have been attained within 10 min. At least 11 out of the 12 lifejacket lights should continue to provide a luminous intensity of not less than 0.75 cd in all directions of the upper hemisphere for a period of at least 8 h.</p> <p>In the case of a flashing light it should be established that the rate of flashing for the 8 h operative period is not less than 50 flashes and not more than 70 flashes per minute and that the effective luminous intensity is at least 0.75 cd in all directions of the upper hemisphere. (See formula below to calculate the effective luminous intensity).</p>	<p><u>Results:</u></p> <p>All luminous intensity data is to be attached here.</p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.3Light Tests (continued)		Regulations: LSA Code 1.2.2.3/2.2.3.1.1/2.2.3.1.2/2.2.3.2.2; MSC.81(70) 1/ 10.3.2/10.3.5/10.3.5.2/10.3.5.3/10.4/10.4.9			
Test Procedure		Acceptance Criteria		Significant Test Data	
It must be demonstrated that at least one light from each of the specified temperature ranges reaches the required luminous intensity in all directions of the upper hemisphere when using a photometer which is calibrated to the photometric standards of the appropriate National or State Standard Institute (Note: CIE Publ. No. 70 contains further information.). The lowest voltage light of the cold temperature test sample lot, the highest voltage light of the high temperature test sample lot and the mean voltage light of the ambient temperature sample lot should be selected. These three lights must be used for the light output tests. In the event that a lamp filament burns out during the light output test, a second light from the same performance test lot may be used. Luminous intensity should be measured by a photometer directed at the center of the light source with the test light on a rotating table. Luminous intensity should be measured in a horizontal direction at the level of the center of the light source and continuously recorded through a 360° rotation.		The effective luminous intensity is to be found from the formula :  $\left[ \frac{\int_{t_1}^{t_2} I dt}{0.2 + (t_2 - t_1)} \right]_{\max}$  where :  I is the instantaneous intensity, 0.2 is the Blondel-Rey constant and t1 and t2 are time limits of integration in seconds.		Comments/Observations	

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.3Light Tests (continued)		Regulations: LSA Code 1.2.2.3/2.2.3.1.1/2.2.3.1.2/2.2.3.2.2; MSC.81(70) 1/ 10.3.2/10.3.5/10.3.5.2/10.3.5.3/10.4/10.4.9
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The first measurement should be taken at 0° (horizontal) and should continue to be taken in azimuth angle at 5° intervals to a single measurement at 90° (vertical). Luminous intensity should be measured in a vertical direction, beginning at the center of the light source at the point of lowest recorded light output, and continuously recorded through an arc of 180°. All measured data of luminous intensity and voltage should be documented.</p> <p>After having passed the light tests the lights should be subjected next to the chromaticity test.</p>	<p>Note: Flashing lights with a flash duration of not less than 0.3 s at or above 0.75 cd, not including incandescence time, may be considered as fixed lights for the measurement of luminous intensity. Such lights should provide the required luminous intensity in all directions of the upper hemisphere. (Incandescence time is the time interval between switch on and the luminous intensity reaching the required minimum luminous intensity.)</p>	<p>Comments/Observations</p>

<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.3.4 Chromaticity Test		Regulations: LSA Code 2.2.3.1.4; MSC.81(70) 1/10.3.2/10.4/10.4.10
Test Procedure	Acceptance Criteria	Significant Test Data
At least 11 out of the 12 lifejacket lights which have passed the light tests should be tested for chromaticity to determine that it lies within the boundaries of the area "white" of the diagram specified for each colour by the International Commission on Illumination (CIE). The chromaticities of the lifejacket lights should be measured by means of colorimetric measurement equipment which is calibrated to the appropriate National or State Standards Institute (Note: CIE Publ. No. 15.2 contains further information.). Measurement on at least four points of the upper hemisphere should be taken	<p>The measured chromaticity coordinates should fall within the boundaries of the area of the diagram as per CIE. The boundaries of the area for white lights are given by the following corner coordinates :</p> <p>x 0.500 0.500 0.440 0.300 0.300 0.440 y 0.382 0.440 0.433 0.344 0.278 0.382</p> <p>(International Standard on Colours of Light Signals, with colour tables to be developed by CIE.)</p>	<p><u>Results:</u></p> <p>All chromaticity data is to be attached here.</p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.3.5 Drop Test	Regulations: LSA Code 2.2.1.1.5; MSC.81(70) 1/2.9.6/10.3.2/10.3.3
Test Procedure	Acceptance Criteria
<p>One lifejacket light which has passed the visual inspection should be attached to a lifejacket and then be subjected to a drop test as follows :</p> <p>Without readjusting the lifejacket, the test subject should jump vertically into the water, feet first, from a height of at least 4.5 m. When jumping into the water, the test subject should be allowed to hold on to the lifejacket during water entry to avoid possible injury.</p> <p>For the approval of the lifejacket light, the test result obtained from the participating subject should be acceptable except as provided otherwise.</p> <p>After this drop test the light should be taken from ordinary room conditions and operate immersed in freshwater at ambient temperature. The light should be subjected next to the light tests (see 2.2.3.3) and to the chromaticity test (see 2.2.3.4).</p>	<p>The lifejacket light should not suffer damage, should not be dislodged from the lifejacket and should not injure the wearer and should function after the test. Water-activated lights should commence functioning within 2 min and have reached a luminous intensity of not less than 0.75 cd within 5 min in seawater. In freshwater a luminous intensity of not less than 0.75 cd should have been attained within 10 min. The light should continue to provide a luminous intensity of not less than 0.75 cd in all directions of the upper hemisphere for a period of at least 8 h. (For further details see Light Tests). The measured chromaticity coordinates should fall within the boundaries of the area of the diagram as per CIE. The boundaries of the area for white lights are given by the following corner coordinates :</p> <p style="margin-left: 20px;">x 0.500 0.500 0.440 0.300 0.300 0.440 y 0.382 0.440 0.433 0.344 0.278 0.382</p> <p style="margin-left: 20px;">(International Standard on Colours of Light</p> <p>Signals, with colour tables to be developed by CIE.) (For further details see Chromaticity Test).</p>
	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>



<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.3.6 2 m Light Drop Test		Regulations: MSC.81(70) 1/10.3.4
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifejacket light which has passed the visual inspection should be dropped from a height of 2 m onto a rigidly mounted steel plate or concrete surface.</p> <p>After this test the light should be taken from ordinary room conditions and operate immersed in freshwater at ambient temperature.</p> <p>The light should be subjected next to the light tests (see 2.2.3.3).</p>	<p>The lifejacket light should not suffer damage and should be capable of providing a luminous intensity of not less than 0.75 cd for a period of at least 8 h when operated immersed in freshwater at ambient temperature. (For further details see Light Tests at 2.2.3.3).</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

2.2.3.7 Switch Arrangement Test		Regulations: MSC.81(70) 1/10.3.5/10.3.5.1/10.4/10.4.3	
Test Procedure	Acceptance Criteria	Significant Test Data	
<p>If a manual switch is fitted, the switch arrangement test should be carried out.</p> <p>One lifejacket light which has passed the visual inspection should be subjected to the switch arrangement test.</p> <p>A test person wearing immersion suit gloves, must be able to switch the lifejacket light in its normal operational position on and off three times.</p> <p>After having passed the switch arrangement test the light should be subjected next to the vibration test.</p>	<p>The light must function properly.</p>	<p><u>Results:</u></p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	
2.2.3.8 Vibration Test		Regulations: LSA Code 1.2.2.1/1.2.2.8; MSC.81(70) 1/10.4/10.4.1	
Test Procedure	Acceptance Criteria	Significant Test Data	
<p>The lifejacket light which has passed the switch arrangement test should be subjected to a vibration test according to IEC 945, paragraph 8.7.</p>	<p>The lifejacket light should be constructed with proper workmanship and materials</p> <p>The lifejacket light should function after the test.</p>	<p><u>Results:</u></p> <p>PASS: FAIL:</p> <p>Comments/Observations</p>	

<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.3.9 Mould Growth Test		Regulations: LSA Code 1.2.2.4; MSC.81(70) 1/10.4/10.4.2
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifejacket light which has passed the visual inspection should be subjected to the mould growth test. The lifejacket light should be inoculated by spraying with an aqueous suspension of mould spores containing all the following cultures :</p> <p>Aspergillus niger; Aspergillus terreus; Aureobasidium pullulans; Paecilomyces variotii; Penicillium funiculosum, Penicillium ochrochloron; Scopulariopsis brevicaulis; and Trichoderma viride.</p> <p>The lifejacket light should then be placed in a mould growth chamber which should be maintained at a temperature of 29<sup>0</sup>C +/- 1<sup>0</sup>C and a relative humidity of not less than 95 %. The period of incubation should be 28 days. After this period the lifejacket light should be inspected.</p> <p>(Note: The mould growth test may be waived where the manufacturer is able to produce evidence that the external materials employed will satisfy the test.)</p>	<p>The lifejacket light should be rot-proof and not be unduly affected by fungal attack.</p> <p>There should be no mould growth visible to the naked eye and the lifejacket light should function after the test.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifeguard Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.10 Corrosion and Seawater Resistance Test		Regulations: LSA Code 1.2.2.4; MSC.81(70) 1/10.4/10.4.4			
Test Procedure		Acceptance Criteria		Significant Test Data	
<p>One lifejacket light which has passed the visual inspection should be subjected to a corrosion and seawater resistance test according to IEC 945, paragraph 8.12.</p> <p>(Note :</p> <p>.1 If there are no exposed metal parts the Corrosion and Seawater Resistance Test need not be conducted.</p> <p>.2 The Corrosion and Seawater Resistance Test may be waived where the manufacturer is able to produce evidence that the external metals employed will satisfy the test.</p> <p>.3 Automatic activated version should be prevented from switching during the test.)</p> <p>.4 Where the exposed metal is part of the automatic switch sensor, the function test after the 28 day test cannot be done.</p>		The lifejacket light should be corrosion resistant and not be unduly affected by seawater.		<u>Results:</u>	
		Furthermore, the lifejacket light should comply with the requirements of IEC 945 paragraph 8.12.2.		PASS: FAIL:	
		There should be no undue deterioration of metal parts and the lifejacket light should function after the test.		Comments/Observations	

<b>Lifejacket Lights</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.2.3.11 Test for Oil Resistance		Regulations: LSA Code 1.2.2.4; MSC.81(70) 1/10.4/10.4.6
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifejacket light which has passed the visual inspection should be subjected to the test for oil resistance according to IEC 945, paragraph 8.11. Automatic activated version should be prevented from switching during the test.</p>	<p>After this test the lifejacket light should not be unduly affected by oil and should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.</p> <p>The lifejacket light should function after the test.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>
2.2.3.12 Rain Test and Watertightness Test		Regulations: LSA Code 1.2.2.4/1.2.2.8; MSC.81(70) 1/10.4/10.4.7
Test Procedure	Acceptance Criteria	Significant Test Data
<p>One lifejacket light which has passed the visual inspection should be subjected to a rain test according to IEC 945, paragraph 8.8.</p> <p>After having passed the rain test the lifejacket light and the complete power source should be immersed horizontally under not less than 300 mm of fresh water for at least 24 h.</p> <p>Automatic activated version should be prevented from switching during the test.</p>	<p>The lifejacket light should be rot-proof</p> <p>The lifejacket light should comply with the requirements of IEC 945, paragraph 8.8.2 and should function after the rain test.</p> <p>After the water-tightness test the lifejacket light should function and there should be no evidence of water inside the lifejacket light.</p>	<p><u>Results:</u></p> <p>PASS: _____ FAIL: _____</p> <p>Comments/Observations</p>

<b>Lifejacket Lights</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.2.3.13Fire Test		Regulations: LSA Code 2.2.1.1; MSC.81(70) 1/10.4/10.4.8			
Test Procedure		Acceptance Criteria		Significant Test Data	
One lifejacket light which has passed the visual inspection should be subjected to a fire test. A test pan not less than 30 cm x 35 cm x 6 cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to a depth of at least 1 cm followed by enough petrol to make a minimum total depth of not less than 4 cm. The petrol should then be ignited and allowed to burn freely for at least 30 s. The lifejacket light should then be moved through the flames, facing them, with the lifejacket light not more than 25 cm above the top edge of the test pan so that the duration of exposure to the flames is at least 2s.		The lifejacket light should not sustain burning or continue melting after being totally enveloped in a fire for a period of at least 2 s and after being removed from the flames.  The lifejacket light should function after the test.		<u>Results:</u>	
				PASS:FAIL:	
				Comments/Observations	

## **2.3 IMMERSION SUITS AND ASSOCIATED EQUIPMENT**

### **2.3.1 IMMERSION SUITS (NON-INSULATED)**

#### **EVALUATION AND TEST REPORT**

- 2.3.1.1 General data and specifications
- 2.3.1.2 Submitted drawings, reports and documents
- 2.3.1.3 Quality assurance
- 2.3.1.4 Visual inspection
- 2.3.1.5 Test subjects
- 2.3.1.6 Test with a lifejacket
- 2.3.1.7 Test clothing
- 2.3.1.8 Donning tests 1 & 2
- 2.3.1.9 Ergonomic test
- 2.3.1.10 Field of vision test
- 2.3.1.11 Flotation test
- 2.3.1.12 Righting test
- 2.3.1.13 Water ingress and jump test
- 2.3.1.14 Jump test
- 2.3.1.15 Leak test
- 2.3.1.16 Swimming and water emergence test
- 2.3.1.17 Oil resistance test
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- 2.3.1.19 Fire test
- 2.3.1.20 Temperature cycling test
- 2.3.1.21 Temperature cycling test - Test data
- 2.3.1.22 Buoyancy test
- 2.3.1.23 Strength test
- 2.3.1.24 Thermal protective test (General)
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- 2.3.1.26 Test sheets for temperatures during immersion tests

### 2.3.1 IMMERSION SUITS (NON-INSULATED)

#### EVALUATION AND TEST REPORT

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	



<b>Immersion Suits (non-insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.1 General Data and Specifications	Regulations: LSA Code II/2.3; MSC.81(70) I/3.1 & 3.2;
<b>Construction Material:</b>  Fabric produced by: _____  Type: _____  Buoyant material produced by: _____  Type: _____	<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;"> <b>Additional equipment:</b>             Retro reflective material            produced by: _____             Type: _____             Whistle produced            by (if fitted): _____             Type: _____             Life-line produced by (if fitted): _____             Type: _____             Light produced by (if fitted): _____             Type: _____         </div> <div style="width: 30%; vertical-align: top;"> <b>Donning instructions:</b>   <div style="text-align: center;"> <input type="checkbox"/> YES    <input type="checkbox"/> NO         </div> </div> </div>

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.2 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Immersion Suits (non-insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.3 <b>Quality Assurance</b>	<b>Regulations: -</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: _____</p> <p>Quality Assurance Procedure: _____</p> <p>Quality Assurance Manual: _____</p> <p>Description of System:</p>  <p>Quality Assurance System acceptable Yes _____ No _____</p> <p>Comments/Observations</p>          

	Manufacturer: _____	Date: _____	Time: _____
<b>Immersion Suits (non-insulated)</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.4 Visual Inspection	Regulations: LSA Code I/1.2.2, II/2.3.1.1.3 & 2.3.1.1.4								
Test Procedure	Acceptance Criteria								
<p>Non Insulated Immersion suit should:</p> <p>be clearly marked with approval information including the Administration which approved it, date of manufacturer and any operational restrictions;</p> <p>be provided with labels giving operating instructions, general information and manufacturers details as appropriate; and</p> <p>be fitted with approved patches of retro-reflective material with a total area of at least 400 cm<sup>2</sup> and with 100 cm<sup>2</sup> on the back if the suit does not automatically turn the wearer face up according to IMO Res. 658(16).</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Passed _____</td><td style="width: 50%;">Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td colspan="2" style="height: 150px; vertical-align: bottom; padding-top: 10px;">Comments/Observations</td></tr> </table>	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Comments/Observations	
Passed _____	Failed _____								
Passed _____	Failed _____								
Passed _____	Failed _____								
Comments/Observations									

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.4 Visual Inspection (Continued)	Regulations: LSA Code I/1.2.2, II/2.3.1.1.3 & 2.3.1.1.4
Test Procedure	Acceptance Criteria
Does the non-insulated immersion suit cover the whole body with the exception of the face?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
Are the hands covered, or is the non-insulated immersion suit equipped with permanently attached gloves?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
Are their arrangements to prevent excessive free air in the legs?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
Is the non-insulated immersion suit of highly visible colour?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
Is the non-insulated immersion suit designed to be worn without a lifejacket?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
If yes Is the non-insulated immersion suit fitted with a light complying with paragraph 2.2.3?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
Is the non-insulated immersion suit fitted with a whistle complying with paragraph 2.2.1.8?	<div style="display: flex; justify-content: space-between;"> <span>Passed _____</span> <span>Failed _____</span> </div>
	Comments/Observations

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.5      Test subjects		Regulations: LSA Code II/2.3.1.1.5, 2.3.1.3.1 - .4; MSC.81(70) 1/3.1.1 & 2.8.2			
Test Procedure	Acceptance Criteria		Significant Test Data		
At least six able-bodied persons both male and females of the following heights and weights should be used. At least one and not more than two of the persons should be females with not more than one female in the same height range.	<u>Height</u>	<u>Weight</u>	<u>Male/Female</u>	<u>Height</u>	<u>Weight</u>
	1.40m - 1.60m;	1 person under 60kg 1 person over 60kg	Subject No.1	_____	_____
	1.60m - 1.80m	1 person under 70kg 1 person over 70kg	Subject No.2	_____	_____
	over 1.80m	1 person under 80kg 1 person over 80kg	Subject No.3	_____	_____
			Subject No.4	_____	_____
			Subject No.5	_____	_____
			Subject No.6	_____	_____
			Comments/Observations		

2.3.1.6      Test with a lifejacket		Regulations: LSA Code II/2.3.1.5; MSC.81(70) 1/3.1.2		
Test Procedure	Acceptance Criteria		Significant Test Data	
If the suit is to be worn in conjunction with a lifejacket, the lifejacket should be worn over the suit for the tests prescribed in 2.3.1.8 to 2.3.1.16.			Manufacturer of lifejacket: _____	
			Type: _____	
			Manufacturer of lifejacket: _____	
			Type:_____	
			Manufacturer of lifejacket:_____	
			Type:_____	
		Comments/Observations		

<b>Immersion Suits (non-insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.7 Test clothing	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.2.6																														
Test Procedure	Acceptance Criteria	Significant Test Data																													
<p>The test subjects should wear a standard range clothing consisting of</p> <ol style="list-style-type: none"> <li>1 underwear (short sleeved, short legged)</li> <li>2 shirt(long sleeved)</li> <li>3 trousers(not woollen, and</li> <li>4 woollen socks</li> <li>5 in addition to the clothing the test subject should wear two woollen pullovers during the thermal protective tests.</li> </ol>		<p>Did all test subject use the specified test clothing</p> <p><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Comments/Observations</p>																													
2.3.1.8 Donning test (1)	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.3																														
Test Procedure	Acceptance Criteria	Significant Test Data																													
<p>Following a demonstration, each test subject should be able to unpack, don and secure the immersion suit over their test clothing without assistance in less than 2 min. This time should include the time to don any associated clothing, and a lifejacket, if such is to be worn in conjunction with the immersion suit, and the test subjects should be able to don such lifejacket without assistance.</p>	<p>Each test subjects should be able to unpack, don and secure the immersion suit over their test clothing (see 2.3.1.7) without assistance in less than 2 min. This time should include the time to don any associated clothing, and a lifejacket, if such is to be worn in conjunction with the immersion suit.</p>	<p><u>Donning time</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Time</th> <th style="width: 15%; text-align: center;">Pass</th> <th style="width: 15%; text-align: center;">Fail</th> </tr> </thead> <tbody> <tr> <td>Subject No.1</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.2</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.3</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.4</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.5</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.6</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> </tbody> </table> <p>Comments/Observations</p>			Time	Pass	Fail	Subject No.1	_____sec			Subject No.2	_____sec			Subject No.3	_____sec			Subject No.4	_____sec			Subject No.5	_____sec			Subject No.6	_____sec		
	Time	Pass	Fail																												
Subject No.1	_____sec																														
Subject No.2	_____sec																														
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Subject No.6	_____sec																														

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.8 Donning test (2)		Regulations: LSA Code I/1.2.2.3; MSC.81(70) 1/3.1.4			
Test Procedure	Acceptance Criteria	Significant Test Data			
The immersion suit should be capable of being donned in a reasonable time at an ambient temperature as low as -30° C. Before the donning test the packed immersion suit should be kept in a refrigerated chamber at a temperature of -30° C for 24 h.	The test subject should be able to complete this task in a reasonable time.	<u>Donning time at - 30<sup>0</sup>C</u>			
		Time	Passed	Failed	
		Subject No.1	_____sec		
		Subject No.2	_____sec		
		Subject No.3	_____sec		
		Subject No.4	_____sec		
		Subject No.5	_____sec		
		Subject No.6	_____sec		
Comments/Observations					



<b>Immersion Suits (non-insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.9      Ergonomic Test		Regulations: LSA Code II/2.3.1.3.1, 2.3.1.3.2; MSC.81(70) 1/3.1.5
Test Procedure	Acceptance Criteria	Significant Test Data
<p>When wearing the immersion suit, the test subjects should be able to :</p> <p>1.      Climb up and down a vertical ladder of at least 5 m in length;</p> <p>2.      Perform all duties associated with abandonment; and</p> <p>3.      To pick up a pencil and write.</p>	<p>There should be no restriction in walking, bending over or arm movement. The diameter of the pencil should be 8-10 mm.</p>	<p>Restriction in walking, bending over or arm movement:    </p>

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.10Field of vision test		Regulations: LSA Code II/2.3.1.1.3; MSC.81(70) 1/3.1.6																									
Test Procedure	Acceptance Criteria	Significant Test Data																									
Each test subject should be seated with the head in a fixed position, and the lateral field of vision measured.	The lateral field of vision should be at least 120°.	Field of vision angle ⌚ 120°  <table><tr><td></td><td>Passed</td><td>Failed</td></tr><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr><tr><td colspan="3">Comments/Observations</td></tr></table>			Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
	Passed	Failed																									
Subject No.1	_____	_____																									
Subject No.2	_____	_____																									
Subject No.3	_____	_____																									
Subject No.4	_____	_____																									
Subject No.5	_____	_____																									
Subject No.6	_____	_____																									
Comments/Observations																											

2.3.1.11Flotation test		Regulations: LSA Code II/2.3.1.1; MSC.81(70) 1/3.1.7																									
Test Procedure	Acceptance Criteria	Significant Test Data																									
With the test subject floating at rest, wearing the suit in conjunction with a lifejacket if required, the freeboard should be measured from the water surface to the nose or mouth.	The test subject should float face-up with their mouths clear of the water by at least 120mm and be stable in that position.	<table><tr><td></td><td>Mouth Freeboard =↓</td><td>Nose Freeboard = ↓</td></tr><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr><tr><td colspan="3">Comments/Observations</td></tr></table>			Mouth Freeboard =↓	Nose Freeboard = ↓	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
	Mouth Freeboard =↓	Nose Freeboard = ↓																									
Subject No.1	_____	_____																									
Subject No.2	_____	_____																									
Subject No.3	_____	_____																									
Subject No.4	_____	_____																									
Subject No.5	_____	_____																									
Subject No.6	_____	_____																									
Comments/Observations																											

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.12      Righting test		Regulations: LSA Code II/2.3.3; MSC.81(70) 1/3.1.8		
Test Procedure	Acceptance Criteria	Significant Test Data		
The test subjects in fresh water wearing either a non-insulated immersion suit or a non-insulated immersion suit with a lifejacket should each demonstrate that they can turn themselves from a face-down to a face-up position in not more than 5 s.	Except where it has been demonstrated that the non-insulated immersion suit will right the test subjects within 5 s, the test subjects should each demonstrate that they can turn themselves from a face-down to a face-up position in not more than 5 s.		Passed	Failed
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
		Subject No.6	_____	_____
Comments/Observations				

2.3.1.13      Water ingress and jump test		Regulations: LSA Code II/2.3.3; MSC.81(70) 1/3.1.9		
Test Procedure	Acceptance Criteria	Significant Test Data		
The test subjects should pre-wet their non-insulated immersion suit and then be weighed. Following a jump into the water from a height sufficient to totally immerse the body, each test subject should be weighed again.  Weighing should be performed on a machine accurate to ± 100g	The difference in the combined mass of the test subject and the suit should not exceed 500 g.		Mass difference ≤ 500g	
			Pass	Fail
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
Subject No.6	_____	_____		
Comments/Observations				

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.14 Jump test	Regulations: LSA Code II/2.3.1.3.3; MSC.81(70) 1/3.1.10																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subjects should jump with the suit and lifejacket if required from a height of 4.5m vertically into the water. After the jump, the suit should be examined for damage or dislodging, and the test subject should be questioned concerning whether the suit caused any injury to the wearer.</p>	<p>The suit should not be damaged or dislodged in any way.</p> <p>The test subject should not be injured by the suit</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Passed</th> <th style="text-align: center;">Failed</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td colspan="3" style="padding-top: 10px;">Comments/Observations</td></tr> </tbody> </table>		Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
	Passed	Failed																								
Subject No.1	_____	_____																								
Subject No.2	_____	_____																								
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Subject No.4	_____	_____																								
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Subject No.6	_____	_____																								
Comments/Observations																										
2.3.1.15 Leak test	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.11																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subject should pre-wet the immersion suit and be weighed. The test subject should then be instructed to do one of the following:</p> <ol style="list-style-type: none"> <li>1. a period of flotation in calm water of 1h ; or</li> <li>2. swimming for 20 min for a distance of at least 200 m</li> </ol> <p>The test subject should be weighed again after the task.</p> <p>The weighing machine should be accurate to <math>\pm 100g</math></p>	<p>The ingress of water into the pre-wetted suit should not exceed a mass of 200g.</p>	<p>Indicate which alternative is used. <input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress <math>\leq 200g</math></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Passed</th> <th style="text-align: center;">Failed</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td colspan="3" style="padding-top: 10px;">Comments/Observations</td></tr> </tbody> </table>		Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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Subject No.1	_____	_____																								
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Comments/Observations																										

	Manufacturer: _____	Date: _____	Time: _____
<b>Immersion Suits (non-insulated)</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.16Swimming and water emergence test		Regulations: LSA Code II/2.3.1.3.4; MSC.81(70) 1/3.1.12		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>All test subjects, each wearing a lifejacket but not the suit, should attempt to swim 25 m and board a liferaft or rigid platform with its surface 300 mm above the water surface.</p> <p>Test subjects who successfully complete this task should also perform it wearing the suit.</p> <p>If designed to be used with a lifejacket, then non-insulated immersion suit should be tested with the subject also wearing a lifejacket.</p>	<p>All qualified test subjects should be able to board the liferaft or platform while wearing the non-insulated immersion suit.</p>	1)	25m swim and boarding without lifejacket.	
			PassedFailed	
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
		Subject No.6	_____	_____
		2)	25 m swim and boarding with suit	
			PassedFailed	
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
		Subject No.6	_____	_____
		3)	25 m swim and boarding with suit and a lifejacket, if required	
	PassedFailed			
Subject No.1	_____	_____		
Subject No.2	_____	_____		
Subject No.3	_____	_____		
Subject No.4	_____	_____		
Subject No.5	_____	_____		
Subject No.6	_____	_____		
		Comments/Observations		

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.17 Oil resistance test		Regulations: LSA Code; MSC.81(70) 1/3.1.13																						
Test Procedure	Acceptance Criteria	Significant Test Data																						
<p>After all its apertures have been sealed a non-insulated immersion suit should be immersed for a period of 24 h under 100 mm head of diesel oil at normal room temperature.</p> <p>The surface oil should then be wiped off and the immersion suit subjected to the test prescribed in 2.3.1.16</p>	<p>The ingress of water should not exceed a mass of 200g.</p>	<p>Indicate which alternative is used.</p> <div><input type="checkbox"/> Alternative 1<input type="checkbox"/> Alternative 2</div> <p>Water ingress ≤ 200g</p> <table><tr><td></td><td>Passed</td><td>Failed</td></tr><tr><td>Subject No.1</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.2</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.3</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.4</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.5</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.6</td><td><div></div></td><td><div></div></td></tr></table> <p>Comments/Observations</p>			Passed	Failed	Subject No.1	<div></div>	<div></div>	Subject No.2	<div></div>	<div></div>	Subject No.3	<div></div>	<div></div>	Subject No.4	<div></div>	<div></div>	Subject No.5	<div></div>	<div></div>	Subject No.6	<div></div>	<div></div>
	Passed	Failed																						
Subject No.1	<div></div>	<div></div>																						
Subject No.2	<div></div>	<div></div>																						
Subject No.3	<div></div>	<div></div>																						
Subject No.4	<div></div>	<div></div>																						
Subject No.5	<div></div>	<div></div>																						
Subject No.6	<div></div>	<div></div>																						

	Manufacturer: _____	Date: _____	Time: _____
<b>Immersion Suits (non-insulated)</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.18 Alternative Oil resistance test		Regulations: LSA Code; MSC.81(70) 1/3.1.14.1 & .2																						
Test Procedure	Acceptance Criteria	Significant Test Data																						
<p>In lieu of the test for oil resistance prescribed in 2.3.1.17 either of the following tests may be conducted.</p> <p>After all apertures have been sealed, the non-insulated immersion suit should be immersed for a period of 24 h under 100 mm head of diesel oil at normal room temperature if necessary using weights to keep suit submerged. Any surface oil should then be wiped off and the non-insulated immersion suit turned inside out. The suit should then be laid on a table suitable for collecting and draining off any leakage and be supported at the neck aperture by a suitable designed hanger. The suit should then be filled with water to neck level which should be 300mm above the table.</p> <p>Representative samples of the exterior fabric and seams should be immersed under 100mm head of diesel oil for 24 h. After removal from the oil the samples should be wiped off before being subjected to the following tests: -</p> <p>1. a hydrostatic test of a 1m water head and</p> <p>2. a tensile test of representative seams</p>	<p>After 1h in this position there should be no leakage exceeding a mass of 200g</p> <p>The seam strength should be not less than 150 N</p> <p>The samples should successfully support 1 m head of water</p>	<p>Indicate which alternative is used.</p> <p><input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress ≤ 200g</p> <table><tr><td></td><td>Passed</td><td>Failed</td></tr><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr></table> <p>Strength &gt; 150N    Passed _____ Failed _____</p> <p>Passed _____ Failed _____</p> <p>The samples should support a 1 m head of water.</p> <p>Comments/Observations</p>			Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____
	Passed	Failed																						
Subject No.1	_____	_____																						
Subject No.2	_____	_____																						
Subject No.3	_____	_____																						
Subject No.4	_____	_____																						
Subject No.5	_____	_____																						
Subject No.6	_____	_____																						

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.19Fire test		Regulations: LSA Code II/2.3.1.1.2; MSC.81(70) 1/3.1.15
Test Procedure	Acceptance Criteria	Significant Test Data
A test pan 30x35x6cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to make a minimum total depth of 1 cm followed by enough petrol to make a minimum dept of 4 cm. The petrol should then be ignited and allowed to burn freely for 30 s. If necessary the immersion suit should be draped over a hanger to ensure the whole of the suit is enveloped in the flames, with the bottom of the suit 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 s.	The non-insulated immersion suit should not sustain burning or continue melting after being removed from exposure to the flames.	Did the immersion suit sustain burning or continue melting after being removed from the flames?  <div><input type="checkbox"/> YES<input type="checkbox"/> NO</div> Comments/Observations



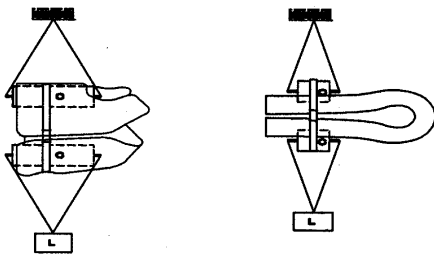
	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.20      Temperature cycling test		Regulations: LSA Code I/1.2.1.2; MSC.81(70) 1/3.1.16	
Test Procedure		Acceptance Criteria	
The following test should be carried out on two immersion suits  The non-insulated immersion suits should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:  .1    an 8 h cycle at +65°C to be completed in one day; and .2    the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day; .3    an 8 h cycle at -30°C to be completed the next day; and .4    the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.		The non-insulated immersion suits material should show no signs of damage such as shrinking, swelling dissolution or changes of mechanical qualities.	
		Significant Test Data	
		(See following page for test data)	
		Passed _____                      Failed _____	
		Comments/Observations	

	Manufacturer: _____	Date: _____	Time: _____
<b>Immersion Suits (non-insulated)</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.1.21	Temperature cycling test - Test Data	Regulations: LSA Code I/1.2.1; MSC.81(70) 1/3.1.16		
	<i><b>HOT CYCLE</b></i>	<i><b>COLD CYCLE</b></i>		
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

	Manufacturer: _____	Date: _____	Time: _____
<b>Immersion Suits (non-insulated)</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

<b>2.3.1.22 Buoyancy test</b>	<b>Regulations: LSA Code II/2.3.1.4; MSC.81(70) 1/3.1.17</b>	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The buoyancy of a non-insulated immersion suit designed to be worn without a lifejacket should be measured before and after 24 h complete submersion to just below the surface in fresh water.</p>	<p>The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy</p>	<p>           Buoyancy 1    Buoyancy 2    % difference            _____ kg    _____ kg    _____ %             Passed _____    Failed _____             Comments/Observations         </p>
<b>2.3.1.23 Strength test</b>	<b>Regulations: LSA Code II; MSC.81(70) 1/3.1.18</b>	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The non-insulated immersion suit should be immersed in water for a period of 2 min. The immersion suit closed in the same manner as when worn by a person, a force of not less than 1350N should be applied for 30 min to the part of the immersion suit that secures it to the body of the wearer.</p> <div style="text-align: center;">  <p style="margin-top: 10px;"> <span style="display: inline-block; width: 40%; text-align: center;">Vest-type lifejacket</span> <span style="display: inline-block; width: 40%; text-align: center;">Yoke or over-the-head type lifejacket</span> </p> </div> <p>The non-inflated immersion suit may be cut if necessary to accommodate to the test device.</p>	<p>The non-insulated immersion suit should not be damaged as a result of this test.</p>	<p>           Passed _____    Failed _____             Comments/Observations         </p>

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.24 Thermal protective test (General)		Regulations: LSA Code II/2.3.2.1; MSC.81(70) 1/3.2.1 – 3.2.4
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The thermal protective qualities may be measured using a thermal manikin, when such a method is required by an Administration and has been demonstrated to provide test results which correlate satisfactorily in all aspects to test results using human subjects.</p> <p>If human subjects are used, they should be medically examined before being accepted for the tests. Each design of immersion suit is to be tested by test subjects specified in 2.3.1.5</p> <p>Where human subjects are used, the tests should always be conducted under the supervision of physician. Emergency resuscitation equipment should be available during all tests. For safety reasons, ECG should be monitored during every test. Testing should be stopped at the wish of the test subjects, or if the skin temperature of hand, foot or lumbar region should fall below 10° C, or if the attending physician considers it advisable.</p> <p>When testing with human subjects, continuous body core temperature (rectal temperature) and skin temperature of lumbar region, both hands, calves, foot (foot instep) and heels, should be measured. The accuracy of the measuring system should be 0.2°C. Appropriate corresponding measurements should be taken if a manikin is used in lieu of human subjects.</p>		Comments/Observations

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.1.25 Thermal Protective test (Continued)		Regulations: LSA Code II/2.3.2.1.2; MSC.81(70) 1/3.2.9 & 3.2.10																																																
Test Procedure	Acceptance Criteria	Significant Test Data																																																
<p>Prior to tests, the same amount of water resulting from the water ingress and jump test in 2.3.1.13 should be poured into the dry suit worn over the dry test clothing specified in 2.3.1.7 by the test subject lying down.</p> <p>Each test subject should wear a non-insulated immersion suit previously subjected to the jump test in 2.3.1.14. Following a 1 h period of immersion, with hands gloved, in circulating calm water at + 5° C, each test subject's body core temperature should not fall more than 2° C below the normal level of the subject's temperature.</p> <p>The non-insulated immersion suit should provide sufficient thermal protection to ensure that immediately on leaving the water after completion of the test prescribed above each test subject can pick up a pencil as specified in 2.3.1.9 and write.</p>	<p>Following immersion each test subject's body core temperature should not fall more than 2°C below the normal level of the subject's temperature.</p>	<p>Same amount of water resulting from the water ingress and jump test in paragraph 2.3.1.13 should be poured into the dry suit.</p> <table><tr><td></td><td>Beginning of test</td><td>End of test</td><td>normal temperature</td></tr><tr><td>Subject No.1</td><td></td><td></td><td></td></tr><tr><td>Subject No.2</td><td></td><td></td><td></td></tr><tr><td>Subject No.3</td><td></td><td></td><td></td></tr><tr><td>Subject No.4</td><td></td><td></td><td></td></tr><tr><td>Subject No.5</td><td></td><td></td><td></td></tr><tr><td>Subject No.6</td><td></td><td></td><td></td></tr></table> <p>Passed _____ Failed _____</p> <p>Pick up a pencil and write after 1 h period of immersion:</p> <table><tr><td>Subject No 1</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr><tr><td>Subject No 2</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr><tr><td>Subject No 3</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr><tr><td>Subject No 4</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr><tr><td>Subject No 5</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr><tr><td>Subject No 6</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr></table> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p> <p>See attached test sheets for temperatures during the immersion tests.</p>				Beginning of test	End of test	normal temperature	Subject No.1				Subject No.2				Subject No.3				Subject No.4				Subject No.5				Subject No.6				Subject No 1	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 2	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 3	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 4	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 5	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 6	<input type="checkbox"/> YES	<input type="checkbox"/> NO
	Beginning of test	End of test	normal temperature																																															
Subject No.1																																																		
Subject No.2																																																		
Subject No.3																																																		
Subject No.4																																																		
Subject No.5																																																		
Subject No.6																																																		
Subject No 1	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																
Subject No 2	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																
Subject No 3	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																
Subject No 4	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																
Subject No 5	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																
Subject No 6	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (non-insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.1.3.26 Test sheets for temperatures during immersion tests			Regulations: LSA Code II/2.3.2.1.2; MSC.81(70) 1/3.2.9& 3.2.		
SUBJECT 1	SUBJECT 2	SUBJECT 3	SUBJECT 4	SUBJECT 5	SUBJECT 6
Rectal temp after 1 hr:_____	Rectal temp after 1 hr:_____	Rectal temp after 1 hr:_____	Rectal temp after 1 hr:_____	Rectal temp after 1 hr:_____	Rectal temp after 1 hr:_____
Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____
Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 1 hr:_____
Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 1 hr:_____
Skin temp at calves after 1 hr:_____	Skin temp at calves after 1 hr:_____	Skin temp at calves after 1 hr:_____	Skin temp at calves after 1 hr:_____	Skin temp at calves after 1 hr:_____	Skin temp at calves after 1 hr:_____
Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot (foot instep) after 1 hr:_____
Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot (foot instep) after 1 hr:_____
Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 1 hr:_____

## **2.3.2 IMMERSION SUITS (INSULATED)**

### **EVALUATION AND TEST REPORT**

2.3.2.1	General data and specifications
2.3.2.2	Submitted drawings, reports and documents
2.3.2.3	Quality assurance
2.3.2.4	Visual inspection
2.3.2.5	Test subjects
2.3.2.6	Test with a lifejacket
2.3.2.7	Test clothing
2.3.2.8	Donning tests 1 & 2
2.3.2.9	Ergonomic test
2.3.2.10	Field of vision test
2.3.2.11	Flotation test
2.3.2.12	Righting test
2.3.2.13	Water ingress and jump test
2.3.2.14	Jump test
2.3.2.15	Leak test
2.3.2.16	Swimming and water emergence test
2.3.2.17	Oil resistance test
2.3.2.18	Alternative Oil resistance test
2.3.2.19	Fire test
2.3.2.20	Temperature cycling test
2.3.2.21	Temperature cycling test - Test data
2.3.2.22	Buoyancy test
2.3.2.23	Strength test
2.3.2.24	Thermal protective test (General)
2.3.2.25	Thermal protective test (continued)
2.3.2.26	Test sheets for temperatures during immersion tests

### 2.3.2 IMMERSION SUITS (INSULATED)

#### EVALUATION AND TEST REPORT

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	



<b>Immersion Suits (insulated)</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.1 General Data and Specifications		Regulations: LSA Code 2.3; MSC.81(70);
<b>Construction Material:</b>  Fabric produced by: _____  Type: _____  Buoyant material produced by: _____  Type: _____	<b>Additional equipment:</b>  Retro reflective material produced by: _____  Type: _____  Whistle produced by (if fitted): _____  Type: _____  Life-line produced by (if fitted): _____  Type _____  Light produced by (if fitted): _____  Type: _____	<b>Donning instructions:</b>  <input type="checkbox"/> YES <input type="checkbox"/> NO

<b>Immersion Suits (insulated)</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.2 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Immersion Suits (insulated)</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.3.2.3 Quality Assurance</b>	<b>Regulations: -</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: -</p> <p>Quality Assurance Procedure: -</p> <p>Quality Assurance Manual: -</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.2.4 Visual Inspection		Regulations: LSA Code I/1.2.2, & II/2.3.1..4			
Test Procedure		Acceptance Criteria		Significant Test Data	
<p>Insulated Immersion suit should:</p> <p>be clearly marked with approval information including the Administration which approved it, date of manufacturer and any operational restrictions;</p> <p>be provided with labels giving operating instructions, general information and manufacturers details as appropriate; and</p> <p>be fitted with approved patches of retro-reflective material with a total area of at least 400 cm<sup>2</sup> and with 100 cm<sup>2</sup> on the back if the suit does not automatically turn the wearer face up according to IMO Res. 658(16).</p>				Passed _____ Failed _____	
				Passed _____ Failed _____	
				Passed _____ Failed _____	
				Comments/Observations	

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.2.4 Visual Inspection (continued)	Regulations: LSA Code I/1.2.2, & II/2.3.1. 4																
Test Procedure	Acceptance Criteria																
<p>Does the immersion suit cover the whole body with the exception of the face?</p> <p>Are the hands covered, or is the immersion suit equipped with permanently attached gloves?</p> <p>Are their arrangements to prevent excessive free air in the legs?</p> <p>Is the immersion suit of highly visible colour?</p> <p>Is the immersion suit designed to be worn without a lifejacket?</p> <p style="text-align: center;">If yes</p> <p>Is the immersion suit fitted with a light complying with paragraph 2.2.3?</p> <p>Is the immersion suit fitted with a whistle complying with paragraph 2.2.1.8?</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Passed _____</td><td style="width: 50%;">Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td>Passed _____</td><td>Failed _____</td></tr> <tr> <td colspan="2" style="height: 100px; vertical-align: top;">Comments/Observations</td></tr> </table>	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Passed _____	Failed _____	Comments/Observations	
Passed _____	Failed _____																
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Passed _____	Failed _____																
Comments/Observations																	

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.2.5 Test subjects	Regulations: LSA Code I/2.3.1.1.5 & 2.3.1.3.1 - .4; MSC.81(70) 1/3.1.1 & 2.8.2		
Test Procedure	Acceptance Criteria		Significant Test Data
At least six able-bodied persons both male and females of the following heights and weights should be used. At least one and not more than two of the persons should be females with not more than one female in the same height range.	<u>Height</u>	<u>Weight</u>	Male/Female      Height      Weight
	1.40m - 1.60m;	1 person under 60kg 1 person over 60kg	Subject No.1 _____ Subject No.2 _____ Subject No.3 _____ Subject No.4 _____ Subject No.5 _____ Subject No.6 _____
	1.60m - 1.80m	1 person under 70kg 1 person over 70kg	
	over 1.80m	1 person under 80kg 1 person over 80kg	Comments/Observations
2.3.2.6 Test with a lifejacket	Regulations: LSA Code 2.3.1.5; MSC.81(70) 1/3.1.2		
Test Procedure	Acceptance Criteria		Significant Test Data
If the suit is to be worn in conjunction with a lifejacket, the lifejacket should be worn over the suit for the tests prescribed in 2.3.2.8 to 2.3.2.16.			Manufacturer of lifejacket: _____
			Type: _____
			Manufacturer of lifejacket: _____
			Type: _____
			Manufacturer of lifejacket: _____
			Type: _____

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
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	Lot/Serial Number: _____	Organization: _____	

2.3.2.7 Test clothing	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.2.6																														
Test Procedure	Acceptance Criteria	Significant Test Data																													
<p>The test subjects should wear a standard range clothing consisting of</p> <ol style="list-style-type: none"> <li>1 underwear (short sleeved, short legged)</li> <li>2 shirt(long sleeved)</li> <li>3 trousers(not woollen, and</li> <li>4 woollen socks</li> </ol>		<p>Did all test subject use the specified test clothing</p> <p><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Comments/Observations</p>																													
2.3.2.8 Donning test (1)	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.3																														
Test Procedure	Acceptance Criteria	Significant Test Data																													
<p>Following a demonstration, each test subject should be able to unpack, don and secure the suit over their test clothing without assistance in less than 2 min. This time should include the time to don any associated clothing, and a lifejacket, if such is to be worn in conjunction with the suit, and the test subjects should be able to don such lifejacket without assistance.</p>	<p>Each test subjects should be able to unpack, don and secure the immersion suit over their test clothing (see 2.3.2.7) without assistance in less than 2 min. This time should include the time to don any associated clothing, and a lifejacket, if such is to be worn in conjunction with the immersion suit.</p>	<p><u>Donning time normal clothing</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 10%; text-align: center;">Time</th> <th style="width: 15%; text-align: center;">Pass</th> <th style="width: 15%; text-align: center;">Fail</th> </tr> </thead> <tbody> <tr> <td>Subject No.1</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.2</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.3</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.4</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.5</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> <tr> <td>Subject No.6</td> <td style="text-align: center;">_____sec</td> <td></td> <td></td> </tr> </tbody> </table> <p>Comments/Observations</p>			Time	Pass	Fail	Subject No.1	_____sec			Subject No.2	_____sec			Subject No.3	_____sec			Subject No.4	_____sec			Subject No.5	_____sec			Subject No.6	_____sec		
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<b>Immersion Suits (insulated)</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.8 Donning test (2)		Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.4																																	
Test Procedure	Acceptance Criteria	Significant Test Data																																	
The immersion suit should be capable of being donned in a reasonable time at an ambient temperature as low as -30° C. Before the donning test the packed immersion suit should be kept in a refrigerated chamber at a temperature of -30° C for 24 h.	The test subject should be able to complete this task in a reasonable time.	<div>Donning time at - 30<sup>0</sup>C</div> <table><tr><td></td><td>Time</td><td>Pass</td><td>Fail</td></tr><tr><td>Subject No.1</td><td>_____sec</td><td></td><td></td></tr><tr><td>Subject No.2</td><td>_____sec</td><td></td><td></td></tr><tr><td>Subject No.3</td><td>_____sec</td><td></td><td></td></tr><tr><td>Subject No.4</td><td>_____sec</td><td></td><td></td></tr><tr><td>Subject No.5</td><td>_____sec</td><td></td><td></td></tr><tr><td>Subject No.6</td><td>_____sec</td><td></td><td></td></tr><tr><td colspan="4">Comments/Observations</td></tr></table>			Time	Pass	Fail	Subject No.1	_____sec			Subject No.2	_____sec			Subject No.3	_____sec			Subject No.4	_____sec			Subject No.5	_____sec			Subject No.6	_____sec			Comments/Observations			
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<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
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2.3.2.9      Ergonomic Test		Regulations: LSA Code II/2.3.1.3.1; MSC.81(70) 1/3.1.5
Test Procedure	Acceptance Criteria	Significant Test Data
<p>When wearing the immersion suit, the test subjects should be able to :</p> <p>1.      Climb up and down a vertical ladder of at least 5 m in length;</p> <p>2.      Perform all duties associated with abandonment; and</p> <p>3.      To pick up a pencil and write .The diameter of the pencil should be 8-10 mm</p>	<p>There should be no restriction in walking, bending over or arm movement.</p>	<p>Restriction in walking, bending over or arm movement:    </p>

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
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2.3.2.10      Field of vision test		Regulations: LSA Code II/2.3.1.1.3; MSC.81(70) 1/3.1.6		
Test Procedure	Acceptance Criteria	Significant Test Data		
Each test subject should be seated with the head in a fixed position, and the lateral field of vision measured.	The lateral field of vision should be at least 120°.	Field of vision angle    ⌚ 120°		
		Passed	Failed	
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
		Subject No.6	_____	_____
Comments/Observations				

2.3.2.11      Flotation test		Regulations: LSA Code; MSC.81(70) 1/3.1.7		
Test Procedure	Acceptance Criteria	Significant Test Data		
With the test subject floating at rest, wearing the suit in conjunction with a lifejacket if required, the freeboard should be measured from the water surface to the nose or mouth.	The test subject should float face-up with their mouths clear of the water by at least 120mm and be stable in that position.	Mouth	Nose	
		Freeboard =↓	Freeboard = ↓	
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
		Subject No.6	_____	_____
Comments/Observations				

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
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	Lot/Serial Number: _____	Organization: _____	

2.3.2.12 Righting test	Regulations: LSA Code II/2.3.3; MSC.81(70) 1/3.1.8																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subjects, in fresh water wearing either an immersion suit or an immersion suit with lifejacket, should each demonstrate that they can turn themselves from a face-down to a face-up position in not more than 5 s.</p>	<p>Except where it has been demonstrated that the insulated immersion suit will right the test subjects within 5 s, the test subjects should each demonstrate that they can turn themselves from a face-down to a face-up position in not more than 5 s.</p>	<p>Righting time = <math>\leq 5</math> s</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Passed</th> <th style="width: 20%; text-align: center;">Failed</th> </tr> </thead> <tbody> <tr> <td>Subject No.1</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.2</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.3</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.4</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.5</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.6</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td colspan="3" style="padding-top: 10px;">Comments/Observations</td> </tr> </tbody> </table>		Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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2.3.2.13 Water ingress and jump test	Regulations: LSA Code II/2.3.3; MSC.81(70) 1/3.1.9																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subjects should pre-wet their immersion suit and then be weighed. Following a jump into the water from a height sufficient to totally immerse the body, each test subject should be weighed again.</p> <p>Weighing should be performed on a machine accurate to <math>\pm 100</math>g</p>	<p>The difference in the combined mass of the test subject and the suit should not exceed 500 g.</p>	<p>Mass difference <math>\leq 500</math>g</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Passed</th> <th style="width: 20%; text-align: center;">Failed</th> </tr> </thead> <tbody> <tr> <td>Subject No.1</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.2</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.3</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.4</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.5</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>Subject No.6</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td colspan="3" style="padding-top: 10px;">Comments/Observations</td> </tr> </tbody> </table>		Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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2.3.2.14 Jump test	Regulations: LSA Code II/2.3.1.3.3; MSC.81(70) 1/3.1.10																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subjects should jump with the suit and lifejacket if required from a height of 4.5m vertically into the water. After the jump, the immersion suit should be examined for damage or dislodging, and the test subject should be questioned concerning whether the suit caused any injury to the wearer.</p>	<p>The immersion suit should not be damaged or dislodged in any way.</p> <p>The test subject should not be injured by the suit.</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Passed</th> <th style="width: 20%; text-align: center;">Failed</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td colspan="3" style="padding-top: 10px;">Comments/Observations</td></tr> </tbody> </table>		Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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2.3.2.15 Leak test	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.11																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subject should pre-wet the immersion suit and be weighed. The test subject should then be instructed to do one of the following:</p> <ol style="list-style-type: none"> <li>1. a period of flotation in calm water of 1h ; or</li> <li>2. swimming for 20 min for a distance of at least 200 m</li> </ol> <p>The test subject should be weighed again after the task.</p> <p>The weighing machine should be accurate to <math>\pm 100\text{g}</math>.</p>	<p>The ingress of water into the pre-wetted suit should not exceed a mass of 200g.</p>	<p>Indicate which alternative is used. <input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress <math>\leq 200\text{g}</math></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Passed</th> <th style="width: 20%; text-align: center;">Failed</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td colspan="3" style="padding-top: 10px;">Comments/Observations</td></tr> </tbody> </table>		Passed	Failed	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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2.3.2.16Swimming and water emergence test		Regulations: LSA Code II/2.3.1.3.4; MSC.81(70) 1/3.1.12																																											
Test Procedure	Acceptance Criteria	Significant Test Data																																											
<p>All test subjects, each wearing a lifejacket but not the immersion suit, should attempt to swim 25 m and board a liferaft or rigid platform with its surface 300 mm above the water surface.</p> <p>Test subjects who successfully complete this task should also perform it wearing the immersion suit.</p> <p>If designed to be used with a lifejacket, then immersion suit should be tested with the subject also wearing a lifejacket.</p>	<p>All qualified test subjects should be able to board the liferaft or platform while wearing the immersion suit.</p>	<div><div>1)25m swim and boarding without lifejacket.</div><table><thead><tr><th></th><th>Pass</th><th>Fail</th></tr></thead><tbody><tr><td>Subject No.1</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.2</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.3</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.4</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.5</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.6</td><td><div></div></td><td><div></div></td></tr></tbody></table><div>2)25 m swim and boarding with immersion suit</div><table><thead><tr><th></th><th>Pass</th><th>Fail</th></tr></thead><tbody><tr><td>Subject No.1</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.2</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.3</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.4</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.5</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.6</td><td><div></div></td><td><div></div></td></tr></tbody></table><div>Comments/Observations</div></div>			Pass	Fail	Subject No.1	<div></div>	<div></div>	Subject No.2	<div></div>	<div></div>	Subject No.3	<div></div>	<div></div>	Subject No.4	<div></div>	<div></div>	Subject No.5	<div></div>	<div></div>	Subject No.6	<div></div>	<div></div>		Pass	Fail	Subject No.1	<div></div>	<div></div>	Subject No.2	<div></div>	<div></div>	Subject No.3	<div></div>	<div></div>	Subject No.4	<div></div>	<div></div>	Subject No.5	<div></div>	<div></div>	Subject No.6	<div></div>	<div></div>
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2.3.2.17 Oil resistance test		Regulations: LSA Code; MSC.81(70) 1/3.1.13																						
Test Procedure	Acceptance Criteria	Significant Test Data																						
<p>After all its apertures have been sealed an immersion suit should be immersed for a period of 24 h under 100 mm head of diesel oil at normal room temperature.</p> <p>The surface oil should then be wiped off and the immersion suit subjected to the test prescribed in 2.3.2.16</p> <p>The ingress of water should not exceed a mass of 200g.</p>		<p>Indicate which alternative is used.</p> <p><input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress ≤ 200g</p> <table><tr><td></td><td>Pass</td><td>Fail</td></tr><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr></table> <p>Comments/Observations</p>			Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____
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2.3.2.18	Alternative Oil resistance test	Regulations: LSA Code; MSC.81(70) 1/3.1.14																					
Test Procedure	Acceptance Criteria	Significant Test Data																					
<p>In lieu of the test for oil resistance prescribed in 2.3.2.17 either of the following tests may be conducted.</p> <p>After all apertures have been sealed, the immersion suit should be immersed for a period of 24 h under 100 mm head of diesel oil at normal room temperature if necessary using weights to keep suit submerged. Any surface oil should then be wiped off and the immersion suit turned inside out. The suit should then be laid on a table suitable for collecting and draining off any leakage and be supported at the neck aperture by a suitable designed hanger. The suit should then be filled with water to neck level which should be 300mm above the table</p> <p>Representative samples of the exterior fabric and seams should be immersed under 100mm head of diesel oil for 24 h. After removal from the oil the samples should be wiped off before being subjected to the following tests: -</p> <ol style="list-style-type: none"> <li>a hydrostatic test of a 1m water head and</li> <li>a tensile test of representative seams</li> </ol>	<p>After 1h in this position there should be no leakage exceeding a mass of 200g</p> <p>The samples should successfully support 1 m head of water</p> <p>The seam strength should be not less than 150 N</p>	<p>Indicate which alternative is used.  <input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress <math>\leq 200g</math></p> <table> <tr> <td></td> <td>Pass</td> <td>Fail</td> </tr> <tr> <td>Subject No.1</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.2</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.3</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.4</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.5</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.6</td> <td>_____</td> <td>_____</td> </tr> </table> <p>Strength <math>&gt; 150N</math>    Pass                  Fail</p> <p>The samples should support a 1 m head of water</p> <p>Pass _____ Fail _____</p> <p>Comments/Observations</p>		Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____
	Pass	Fail																					
Subject No.1	_____	_____																					
Subject No.2	_____	_____																					
Subject No.3	_____	_____																					
Subject No.4	_____	_____																					
Subject No.5	_____	_____																					
Subject No.6	_____	_____																					

<b>Immersion Suits (insulated)</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.19 Fire test		Regulations: LSA Code II/2.3.1.1.2; MSC.81(70) 1/3.1.15
Test Procedure	Acceptance Criteria	Significant Test Data
<p>A test pan 30x35x6cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to make a minimum total depth of 1 cm followed by enough petrol to make a minimum dept of 4 cm. The petrol should then be ignited and allowed to burn freely for 30 s. If necessary the immersion suit should be draped over a hanger to ensure the whole of the suit is enveloped in the flames, with the bottom of the suit 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 s.</p>	<p>The immersion suit should not sustain burning or continue melting after being removed from exposure to the flames.</p>	<p>Did the immersion suit continue to burn or continue melting after being removed from the flames?</p> <p><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Comments/Observations</p>



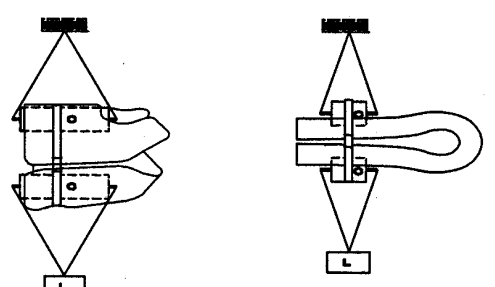
<b>Immersion Suits (insulated)</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.20 Temperature cycling test		Regulations: LSA Code I/1.2.1.2; MSC.81(70) 1/3.1.16
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The following test should be carried out on two immersion suits</p> <p>The immersion suits should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>.1 an 8 h cycle at +65°C to be completed in one day; and</p> <p>.2 the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>.3 an 8 h cycle at -30°C to be completed the next day; and</p> <p>.4 the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.</p>	<p>The immersion suits material should show no signs of damage such as shrinking, swelling dissolution or changes of mechanical qualities.</p>	<p>(See following page for test data)</p> <p>Passed _____ Failed</p> <p>Comments/Observations</p>

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

	2.3.2.21 Temperature cycling test - Test data	Regulations: LSA Code I/1.2.1.2; MSC.81(70) 1/3.1.16
	<b><i>HOT CYCLE</i></b>	<b><i>COLD CYCLE</i></b>
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Date Out: _____ Time Out: _____ Duration : _____ hours

<b>Immersion Suits (insulated)</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.2.22 Buoyancy test	Regulations: LSA Code II/2.3.1.4; MSC.81(70) 1/3.1.17	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The buoyancy of an immersion suit designed to be worn without a lifejacket should be measured before and after 24 h complete submersion to just below the surface in fresh water.</p>	<p>The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy</p>	<p>Buoyancy 1      Buoyancy 2      % difference          _____ kg      _____ kg      _____ %</p> <p>Passed _____      Failed _____</p> <p>Comments/Observations</p>
2.3.2.23 Strength test	Regulations: LSA Code; MSC.81(70) 1/3.1.18	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The immersion suit should be immersed in water for a period of 2 min. The immersion suit closed in the same manner as when worn by a person, a force of not less than 1350N should be applied for 30 min to the part of the immersion suit that secures it to the body of the wearer.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Vest-type lifejacket      Yoke or over-the-head type lifejacket</p> <p>The immersion suit may be cut if necessary to accommodate to the test device.</p>	<p>The immersion suit should not be damaged as a result of this test.</p>	<p>Passed _____      Failed _____</p> <p>Comments/Observations</p>

	Manufacturer: _____	Date: _____	Time: _____
<b>Immersion Suits (insulated)</b>	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.3.2.24 Thermal protective test (General)		Regulations: LSA Code II/2.3.2.1; MSC.81(70) 1/3.2.1 – 3.2.4	
Test Procedure		Acceptance Criteria	
<p>The thermal protective qualities may be measured using a thermal manikin, when such a method is required by an Administration and has been demonstrated to provide test results which correlate satisfactorily in all aspects to test results using human subjects.</p> <p>If human subjects are used, they should be medically examined before being accepted for the tests. Each design of immersion suit is to be tested by test subjects specified in 2.3.2.5.</p> <p>Where human subjects are used, the tests should always be conducted under the supervision of physician. Emergency resuscitation equipment should be available during all tests. For safety reasons, ECG should be monitored during every test. Testing should be stopped at the wish of the test subjects, if the falling rate of the core temperature is more than 1.5° C per hour after the first half hour, if the skin temperature of the hand, foot or lumbar region should fall below 10° C, or if the attending physician considers it advisable.</p> <p>When testing with human subjects, continuous body core temperature (rectal temperature) and skin temperature of lumbar region, both hands, calves, foot (foot instep) and heels, should be measured. The accuracy of the measuring system should be 0.2°C. Appropriate corresponding measurements should be taken if a manikin is used in lieu of human subjects.</p>			
		Significant Test Data	
		Comments/Observations	



	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.26 Test sheets for temperatures during immersion tests			Regulations: LSA Code II/2.3.2.1.2; MSC.81(70) 1/3.2.9, 3.2.11 & 7.12			
Subject 1	Rectal temp after 1 hr:_____	Rectal temp after 2 hr:_____	Rectal temp after 3 hr:_____	Rectal temp after 4 hr:_____	Rectal temp after 5 hr:_____	Rectal temp after 6 hr:_____
	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 2 hr : _____	Skin temp at lumbar region after 3 hr : _____	Skin temp at lumbar region after 4 hr : _____	Skin temp at lumbar region after 5 hr : _____	Skin temp at lumbar region after 6 hr : _____
	Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 2 hr:_____	Skin temp at left hand after 3 hr:_____	Skin temp at left hand after 4 hr:_____	Skin temp at left hand after 5 hr:_____	Skin temp at left hand after 6 hr:_____
	Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 2 hr:_____	Skin temp at right hand after 3 hr:_____	Skin temp at right hand after 4 hr:_____	Skin temp at right hand after 5 hr:_____	Skin temp at right hand after 6 hr:_____
	Skin temp at calves after 1 hr:_____	Skin temp at calves after 2 hr:_____	Skin temp at calves after 3 hr:_____	Skin temp at calves after 4 hr:_____	Skin temp at calves after 5 hr:_____	Skin temp at calves after 6 hr:_____
	Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot(foot instep) after 2 hr:_____	Skin temp at left foot(foot instep) after 3 hr:_____	Skin temp at left foot(foot instep) after 4 hr:_____	Skin temp at left foot(foot instep) after 5 hr:_____	Skin temp at left foot(foot instep) after 6 hr:_____
	Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot(foot instep) after 2 hr:_____	Skin temp at right foot(foot instep) after 3 hr:_____	Skin temp at right foot(foot instep) after 4 hr:_____	Skin temp at right foot(foot instep) after 5 hr:_____	Skin temp at right foot(foot instep) after 6 hr:_____
	Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 2 r:_____	Skin temp at left heel after 3 hr:_____	Skin temp at left heel after 4 hr:_____	Skin temp at left heel after 5 hr:_____	Skin temp at left heel after 6 hr:_____
Subject 2	Rectal temp after 1 hr:_____	Rectal temp after 2 hr:_____	Rectal temp after 3 hr:_____	Rectal temp after 4 hr:_____	Rectal temp after 5 hr:_____	Rectal temp after 6 hr:_____
	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 2 hr : _____	Skin temp at lumbar region after 3 hr : _____	Skin temp at lumbar region after 4 hr : _____	Skin temp at lumbar region after 5 hr : _____	Skin temp at lumbar region after 6 hr : _____
	Skin temp at left hand after 1 hr:_____	Skin temp at left hand after 2 hr:_____	Skin temp at left hand after 3 hr:_____	Skin temp at left hand after 4 hr:_____	Skin temp at left hand after 5 hr:_____	Skin temp at left hand after 6 hr:_____
	Skin temp at right hand after 1 hr:_____	Skin temp at right hand after 2 hr:_____	Skin temp at right hand after 3 hr:_____	Skin temp at right hand after 4 hr:_____	Skin temp at right hand after 5 hr:_____	Skin temp at right hand after 6 hr:_____
	Skin temp at calves after 1 hr:_____	Skin temp at calves after 2 hr:_____	Skin temp at calves after 3 hr:_____	Skin temp at calves after 4 hr:_____	Skin temp at calves after 5 hr:_____	Skin temp at calves after 6 hr:_____
	Skin temp at left foot (foot instep) after 1 hr:_____	Skin temp at left foot(foot instep) after 2 hr:_____	Skin temp at left foot(foot instep) after 3 hr:_____	Skin temp at left foot(foot instep) after 4 hr:_____	Skin temp at left foot(foot instep) after 5 hr:_____	Skin temp at left foot(foot instep) after 6 hr:_____
	Skin temp at right foot (foot instep) after 1 hr:_____	Skin temp at right foot(foot instep) after 2 hr:_____	Skin temp at right foot(foot instep) after 3 hr:_____	Skin temp at right foot(foot instep) after 4 hr:_____	Skin temp at right foot(foot instep) after 5 hr:_____	Skin temp at right foot(foot instep) after 6 hr:_____
	Skin temp at left heel after 1 hr:_____	Skin temp at left heel after 2hr : _____	Skin temp at left heel after 3 hr:_____	Skin temp at left heel after 4 hr:_____	Skin temp at left heel after 5 hr:_____	Skin temp at left heel after 6 hr:_____

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.26 Test sheets for temperatures during immersion tests (continued)	Regulations: LSA Code II/2.3.2.1.2; MSC.81(70) 1/3.2.9 & 3.2.11 7.12					
<b>Subject 3</b>	Rectal temp after 1 hr:_____ Skin temp at lumbar region after 1 hr : _____ Skin temp at left hand after 1 hr:_____ Skin temp at right hand after 1 hr:_____ Skin temp at calves after 1 hr:_____ Skin temp at left foot (foot instep) after 1 hr:_____ Skin temp at right foot (foot instep) after 1 hr:_____ Skin temp at left heel after 1 hr:_____	Rectal temp after 2 hr:_____ Skin temp at lumbar region after 2 hr : _____ Skin temp at left hand after 2 hr:_____ Skin temp at right hand after 2 hr:_____ Skin temp at calves after 2 hr:_____ Skin temp at left foot(foot instep) after 2 hr:_____ Skin temp at right foot(foot instep) after 2 hr:_____ Skin temp at left heel after 2 r:_____	Rectal temp after 3 hr:_____ Skin temp at lumbar region after 3 hr : _____ Skin temp at left hand after 3 hr:_____ Skin temp at right hand after 3 hr:_____ Skin temp at calves after 3 hr:_____ Skin temp at left foot(foot instep) after 3 hr:_____ Skin temp at right foot(foot instep) after 3 hr:_____ Skin temp at left heel after 3 hr:_____	Rectal temp after 4 hr:_____ Skin temp at lumbar region after 4 hr : _____ Skin temp at left hand after 4 hr:_____ Skin temp at right hand after 4 hr:_____ Skin temp at calves after 4 hr:_____ Skin temp at left foot(foot instep) after 4 hr:_____ Skin temp at right foot(foot instep) after 4 hr:_____ Skin temp at left heel after 4 hr:_____	Rectal temp after 5 hr:_____ Skin temp at lumbar region after 5 hr : _____ Skin temp at left hand after 5 hr:_____ Skin temp at right hand after 5 hr:_____ Skin temp at calves after 5 hr:_____ Skin temp at left foot(foot instep) after 5 hr:_____ Skin temp at right foot(foot instep) after 5 hr:_____ Skin temp at left heel after 5 hr:_____	Rectal temp after 6 hr:_____ Skin temp at lumbar region after 6 hr : _____ Skin temp at left hand after 6 hr:_____ Skin temp at right hand after 6 hr:_____ Skin temp at calves after 6 hr:_____ Skin temp at left foot(foot instep) after 6 hr:_____ Skin temp at right foot(foot instep) after 6 hr:_____ Skin temp at left heel after 6 hr:_____
<b>Subject 4</b>	Rectal temp after 1 hr:_____ Skin temp at lumbar region after 1 hr : _____ Skin temp at left hand after 1 hr:_____ Skin temp at right hand after 1 hr:_____ Skin temp at calves after 1 hr:_____ Skin temp at left foot (foot instep) after 1 hr:_____ Skin temp at right foot (foot instep) after 1 hr:_____ Skin temp at left heel after 1 hr:_____	Rectal temp after 2 hr:_____ Skin temp at lumbar region after 2 hr : _____ Skin temp at left hand after 2 hr:_____ Skin temp at right hand after 2 hr:_____ Skin temp at calves after 2 hr:_____ Skin temp at left foot(foot instep) after 2 hr:_____ Skin temp at right foot(foot instep) after 2 hr:_____ Skin temp at left heel after 2hr:_____	Rectal temp after 3 hr:_____ Skin temp at lumbar region after 3 hr : _____ Skin temp at left hand after 3 hr:_____ Skin temp at right hand after 3 hr:_____ Skin temp at calves after 3 hr:_____ Skin temp at left foot(foot instep) after 3 hr:_____ Skin temp at right foot(foot instep) after 3 hr:_____ Skin temp at left heel after 3 hr:_____	Rectal temp after 4 hr:_____ Skin temp at lumbar region after 4 hr : _____ Skin temp at left hand after 4 hr:_____ Skin temp at right hand after 4 hr:_____ Skin temp at calves after 4 hr:_____ Skin temp at left foot(foot instep) after 4 hr:_____ Skin temp at right foot(foot instep) after 4 hr:_____ Skin temp at left heel after 4 hr:_____	Rectal temp after 5 hr:_____ Skin temp at lumbar region after 5 hr : _____ Skin temp at left hand after 5 hr:_____ Skin temp at right hand after 5 hr:_____ Skin temp at calves after 5 hr:_____ Skin temp at left foot(foot instep) after 5 hr:_____ Skin temp at right foot(foot instep) after 5 hr:_____ Skin temp at left heel after 5 hr:_____	Rectal temp after 6 hr:_____ Skin temp at lumbar region after 6 hr : _____ Skin temp at left hand after 6 hr:_____ Skin temp at right hand after 6 hr:_____ Skin temp at calves after 6 hr:_____ Skin temp at left foot(foot instep) after 6 hr:_____ Skin temp at right foot(foot instep) after 6 hr:_____ Skin temp at left heel after 6 hr:_____

	Manufacturer:_____	Date:_____	Time:_____
<b>Immersion Suits (insulated)</b>	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.3.2.26 Test sheets for temperatures during immersion tests (continued)			Regulations: LSA Code II/2.3.2.1.2; MSC.81(70) 1/3.2.9 & 3.2.11 7.12			
<b>Subject 5</b>	Rectal temp after 1 hr:_____ Skin temp at lumbar region after 1 hr : _____ Skin temp at left hand after 1 hr:_____ Skin temp at right hand after 1 hr:_____ Skin temp at calves after 1 hr:_____ Skin temp at left foot (foot instep) after 1 hr:_____ Skin temp at right foot (foot instep) after 1 hr:_____ Skin temp at left heel after 1 hr:_____ 	Rectal temp after 2 hr:_____ Skin temp at lumbar region after 2 hr : _____ Skin temp at left hand after 2 hr:_____ Skin temp at right hand after 2 hr:_____ Skin temp at calves after 2 hr:_____ Skin temp at left foot(foot instep) after 2 hr:_____ Skin temp at right foot(foot instep) after 2 hr:_____ Skin temp at left heel after 2 r:_____ 	Rectal temp after 3 hr:_____ Skin temp at lumbar region after 3 hr : _____ Skin temp at left hand after 3 hr:_____ Skin temp at right hand after 3 hr:_____ Skin temp at calves after 3 hr:_____ Skin temp at left foot(foot instep) after 3 hr:_____ Skin temp at right foot(foot instep) after 3 hr:_____ Skin temp at left heel after 3 hr:_____ 	Rectal temp after 4 hr:_____ Skin temp at lumbar region after 4 hr : _____ Skin temp at left hand after 4 hr:_____ Skin temp at right hand after 4 hr:_____ Skin temp at calves after 4 hr:_____ Skin temp at left foot(foot instep) after 4 hr:_____ Skin temp at right foot(foot instep) after 4 hr:_____ Skin temp at left heel after 4 hr:_____ 	Rectal temp after 5 hr:_____ Skin temp at lumbar region after 5 hr : _____ Skin temp at left hand after 5 hr:_____ Skin temp at right hand after 5 hr:_____ Skin temp at calves after 5 hr:_____ Skin temp at left foot(foot instep) after 5 hr:_____ Skin temp at right foot(foot instep) after 5 hr:_____ Skin temp at left heel after 5 hr:_____ 	Rectal temp after 6 hr:_____ Skin temp at lumbar region after 6 hr : _____ Skin temp at left hand after 6 hr:_____ Skin temp at right hand after 6 hr:_____ Skin temp at calves after 6 hr:_____ Skin temp at left foot(foot instep) after 6 hr:_____ Skin temp at right foot(foot instep) after 6 hr:_____ Skin temp at left heel after 6 hr:_____ 
<b>Subject 6</b>	Rectal temp after 1 hr:_____ Skin temp at lumbar region after 1 hr : _____ Skin temp at left hand after 1 hr:_____ Skin temp at right hand after 1 hr:_____ Skin temp at calves after 1 hr:_____ Skin temp at left foot (foot instep) after 1 hr:_____ Skin temp at right foot (foot instep) after 1 hr:_____ Skin temp at left heel after 1 hr:_____ 	Rectal temp after 2 hr:_____ Skin temp at lumbar region after 2 hr : _____ Skin temp at left hand after 2 hr:_____ Skin temp at right hand after 2 hr:_____ Skin temp at calves after 2 hr:_____ Skin temp at left foot(foot instep) after 2 hr:_____ Skin temp at right foot(foot instep) after 2 hr:_____ Skin temp at left heel after 2hr : _____ 	Rectal temp after 3 hr:_____ Skin temp at lumbar region after 3 hr : _____ Skin temp at left hand after 3 hr:_____ Skin temp at right hand after 3 hr:_____ Skin temp at calves after 3 hr:_____ Skin temp at left foot(foot instep) after 3 hr:_____ Skin temp at right foot(foot instep) after 3 hr:_____ Skin temp at left heel after 3 hr:_____ 	Rectal temp after 4 hr:_____ Skin temp at lumbar region after 4 hr : _____ Skin temp at left hand after 4 hr:_____ Skin temp at right hand after 4 hr:_____ Skin temp at calves after 4 hr:_____ Skin temp at left foot(foot instep) after 4 hr:_____ Skin temp at right foot(foot instep) after 4 hr:_____ Skin temp at left heel after 4 hr:_____ 	Rectal temp after 5 hr:_____ Skin temp at lumbar region after 5 hr : _____ Skin temp at left hand after 5 hr:_____ Skin temp at right hand after 5 hr:_____ Skin temp at calves after 5 hr:_____ Skin temp at left foot(foot instep) after 5 hr:_____ Skin temp at right foot(foot instep) after 5 hr:_____ Skin temp at left heel after 5 hr:_____ 	Rectal temp after 6 hr:_____ Skin temp at lumbar region after 6 hr : _____ Skin temp at left hand after 6 hr:_____ Skin temp at right hand after 6 hr:_____ Skin temp at calves after 6 hr:_____ Skin temp at left foot(foot instep) after 6 hr:_____ Skin temp at right foot(foot instep) after 6 hr:_____ Skin temp at left heel after 6 hr:_____ 



## **2.4 ANTI -EXPOSURE SUITS**

### **EVALUATION AND TEST REPORT**

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2.4.2	Submitted drawings, reports and documents
2.4.3	Quality assurance
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2.4.8	Donning tests 1 & 2
2.4.9	Ergonomic test
2.4.10	Field of vision test
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2.4.23	Strength test
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2.4.25	Thermal protective test (Continued)
2.4.26	Test sheets for temperatures during immersion tests

**2.4 ANTI -EXPOSURE SUITS**  
**EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.4.2 General Data and Specifications		Regulations: LSA Code 2.3; MSC.81(70);
<b>Construction Material:</b>  Fabric produced by: _____  Type: _____  Buoyant material produced by: _____  Type: _____	<b>Additional equipment:</b>  Retro reflective material: <input type="checkbox"/> YES <input type="checkbox"/> NO  Whistle produced: <input type="checkbox"/> YES <input type="checkbox"/> NO  Life-line: <input type="checkbox"/> YES <input type="checkbox"/> NO  Light: <input type="checkbox"/> YES <input type="checkbox"/> NO	<b>Donning instructions:</b>  <div style="text-align: right;"><input type="checkbox"/> YES      <input type="checkbox"/> NO</div>

<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.4.2 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.4.3 Quality Assurance</b>	<b>Regulations: -</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: - _____</p> <p>Quality Assurance Procedure: - _____</p> <p>Quality Assurance Manual: - _____</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.4 Visual Inspection		Regulations: LSA Code I/1.2.2, II/2.3.1.1.3 & 2.3.1.1.4	
Test Procedure	Acceptance Criteria	Significant Test Data	
Anti-Exposure suit should:  Be clearly marked with approval information including the Administration which approved it, date of manufacturer and any operational restrictions  Be provided with labels giving servicing details and intervals between servicing, operating instructions, general information and manufacturers details.  Be fitted with approved patches of retro-reflective material with a total area of at least 400 cm <sup>2</sup> and with 100 cm <sup>2</sup> on the back if the suit does not automatically turn the wearer face up according to IMO Res. 658(16).		Passed _____	Failed _____
		Passed _____	Failed _____
		Passed _____	Failed _____
		Comments/Observations	

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.4 Visual Inspection (continued)	Regulations: LSA Code I/1.2.2, II/2.3.1.4 & 2.3.1.6
Test Procedure	Acceptance Criteria
<p>Does the Anti-Exposure suit cover the whole body with the exception of the face? Is the Anti-Exposure suit equipped with permanently attached gloves?</p> <p>Are their arrangements to prevent excessive free air in the legs?</p> <p>Is the Anti-Exposure suit of highly visible colour?</p> <p>Is the Anti-Exposure suit designed to be worn without a lifejacket?</p> <p style="text-align: center;">If yes</p> <p>Is the Anti-Exposure suit fitted with a light complying with paragraph 2.2.3?</p> <p>Is the Anti-Exposure suit fitted with a whistle complying with paragraph 2.2.1.8?</p> <p>Is the Anti-Exposure suit specified as must be worn in conjunction with a lifejacket?</p> <p>Is the anti-exposure suit equipped with a pocket for a portable VHF telephone?</p>	<p>Passed _____ Failed _____</p> <p>Passed _____ Failed _____</p> <p>Passed _____ Failed _____</p> <p style="text-align: center;"><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Passed _____ Failed _____</p> <p>Passed _____ Failed _____</p> <p>Passed _____ Failed _____</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.5 Test subjects		Regulations: LSA Code II/2.3.1.1.5 & 2.3.1.3.1 - .4; MSC.81(70) 1/3.1.1 & 2.8.2			
Test Procedure	Acceptance Criteria		Significant Test Data		
At least six able-bodied persons both male and females of the following heights and weights should be used. At least one and not more than two of the persons should be females with not more than one female in the same height range.	<u>Height</u>	<u>Weight</u>			
	1.40m - 1.60m;	1 person under 60kg 1 person over 60kg	Subject No.1	Male/Female	Height
	1.60m - 1.80m	1 person under 70kg 1 person over 70kg	Subject No.2		
	over 1.80m	1 person under 80kg 1 person over 80kg	Subject No.3		
			Subject No.4		
			Subject No.5		
			Subject No.6		
			Comments/Observations		

2.4.6 Test with a lifejacket		Regulations: LSA Code II/2.3.1.5; MSC.81(70) 1/3.1.2			
Test Procedure	Acceptance Criteria		Significant Test Data		
If the Anti-Exposure suit is to be worn in conjunction with a lifejacket, the lifejacket should be worn over the anti - exposure suit for the tests prescribed in 2.4.8 to 2.4.16.			Manufacturer of lifejacket: _____		
			Type: _____		
			Manufacturer of lifejacket: _____		
			Type: _____		
			Manufacturer of lifejacket: _____		
			Type: _____		
		Comments/Observations			



<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.7 Test clothing	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.2.6																														
Test Procedure	Acceptance Criteria	Significant Test Data																													
<p>The test subjects should wear a standard range clothing consisting of</p> <ol style="list-style-type: none"> <li>1 underwear (short sleeved, short legged)</li> <li>2 shirt(long sleeved)</li> <li>3 trousers(not woollen, and</li> <li>4 woollen socks</li> </ol>		<p>Did all test subject use the specified test clothing</p> <p><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Comments/Observations</p>																													
2.4.8 Donning test (1)	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.3																														
Test Procedure	Acceptance Criteria	Significant Test Data																													
<p>It can be unpacked and donned without assistance within 2 min, taking into account test clothing 2.4.7 and a lifejacket if the Anti-Exposure suit is to be worn in conjunction with a lifejacket</p>	<p>Following a demonstration, the test subjects should be able to unpack, don and secure the anti-exposure suit over their test clothing (see 2.4.7) without assistance in less than 2 min. This time should include the time to don any associated clothing, and a lifejacket, if such is to be worn in conjunction with the Anti-exposure suit.</p>	<p><u>Donning time with normal clothing</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 10%; text-align: center;">Time</th> <th style="width: 10%; text-align: center;">Pass</th> <th style="width: 40%; text-align: center;">Fail</th> </tr> </thead> <tbody> <tr> <td>Subject No.1</td> <td>_____ sec</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.2</td> <td>_____ sec</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.3</td> <td>_____ sec</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.4</td> <td>_____ sec</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.5</td> <td>_____ sec</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Subject No.6</td> <td>_____ sec</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> <p>Comments/Observations</p>			Time	Pass	Fail	Subject No.1	_____ sec	_____	_____	Subject No.2	_____ sec	_____	_____	Subject No.3	_____ sec	_____	_____	Subject No.4	_____ sec	_____	_____	Subject No.5	_____ sec	_____	_____	Subject No.6	_____ sec	_____	_____
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<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.8 Donning test (2)		Regulations: LSA Code I/1.2.2.3; MSC.81(70) 1/3.1.4			
Test Procedure	Acceptance Criteria	Significant Test Data			
The test subjects should be able to unpack and don the anti-exposure suit in ambient temperature of -30° C. Before the donning test the Anti-Exposure suit should be kept in a refrigerated chamber at a temperature of -30°C for 24 h.	The test subject should be able to complete this task a reasonable time.	<u>Donning time at - 30<sup>0</sup>C</u>			
		Time	Pass	Fail	
		Subject No.1	_____ sec	_____	_____
		Subject No.2	_____ sec	_____	_____
		Subject No.3	_____ sec	_____	_____
		Subject No.4	_____ sec	_____	_____
		Subject No.5	_____ sec	_____	_____
		Subject No.6	_____ sec	_____	_____
Comments/Observations					

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

2.4.9 Ergonomic Test		Regulations: LSA Code II/2.3.1.3.1; MSC.81(70) 1/3.1.5			
Test Procedure		Acceptance Criteria		Significant Test Data	
<div>When wearing the Anti-Exposure suit, the test subjects should be able to :</div> <div><div>1. Climb up and down a vertical ladder of at least 5 m in length;</div><div>2. Perform all duties associated with abandonment; and</div><div>3. To pick up a pencil and write .The diameter of the pencil should be 8-10 mm</div></div>		<div>There should be no restriction in walking, bending over or arm movement. The diameter of the pencil should be 8-10 mm.</div>		<div>Restriction in walking, bending over or arm movement:</div> <div><div><input type="checkbox"/> YES</div><div><input type="checkbox"/> NO</div></div>	
				<div>All the test subjects where able to pick up a pencil and write:</div> <div><div><input type="checkbox"/> YES</div><div><input type="checkbox"/> NO</div></div>	
				<div>All the test subjects where able to put on the lifejacket without assistance:</div> <div><div><input type="checkbox"/> YES</div><div><input type="checkbox"/> NO</div></div>	
				<div>All the test subjects where able to perform all duties associated with abandonment, assist others and operate a rescue boat:</div> <div><div><input type="checkbox"/> YES</div><div><input type="checkbox"/> NO</div></div>	
				<div>All the test subjects where able to climb up and down a vertical ladder of 5 meter in length:</div> <div><div><input type="checkbox"/> YES</div><div><input type="checkbox"/> NO</div></div>	
				<div>Comments/Observations</div>	

<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.4.10Field of vision test		Regulations: LSA Code II/2.3.1.1.3; MSC.81(70) 1/3.1.6				
Test Procedure	Acceptance Criteria	Significant Test Data				
Each test subject should be seated with the head in a fixed position, and the lateral field of vision measured.	The lateral field of vision should be at least 120°.	Field of vision angle = 120°				
			Angle(degs.)	Pass	Fail	
		Subject No.1	_____	_____	_____	
		Subject No.2	_____	_____	_____	
		Subject No.3	_____	_____	_____	
		Subject No.4	_____	_____	_____	
		Subject No.5	_____	_____	_____	
		Subject No.6	_____	_____	_____	
Comments/Observations						

2.4.11Flotation test		Regulations: LSA Code; MSC.81(70) 1/3.1.7					
Test Procedure	Acceptance Criteria	Significant Test Data					
	When wearing the Anti-Exposure suit, in conjunction with a lifejacket if required, the test subject should float face-up with their mouths clear of the water by at least 120mm and be stable in that position. The freeboard should be measured from the water surface to the nose and mouth with the test subject at rest. The freeboard of the anti-exposure suit without a lifejacket should be at least 50 mm.		With lifejacket		Without lifejacket		
		Freeboard	Mouth (mm)	Nose (mm)	Mouth (mm)	Nose (mm)	
		Subject No.1	_____	_____	_____	_____	
		Subject No.2	_____	_____	_____	_____	
		Subject No.3	_____	_____	_____	_____	
		Subject No.4	_____	_____	_____	_____	
		Subject No.5	_____	_____	_____	_____	
		Subject No.6	_____	_____	_____	_____	
Comments/Observations							

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
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2.4.12 Righting test		Regulations: LSA Code II/2.4.3; MSC.81(70) 1/3.1.8			
Test Procedure	Acceptance Criteria	Significant Test Data			
Test subjects in fresh water wearing an anti-exposure suit complying with the requirements of this section should be able to turn from a face-down to a face-up position in not more than 5 s and should be stable face-up. The suit should have no tendency to turn the wearer face-down in moderate sea condition.	Except where it has been demonstrated that the anti-exposure suit will right the test subjects within 5 s.	Righting time = ≤ 5 s			
			Time (s)	Pass	Fail
		Subject No.1	_____	_____	_____
		Subject No.2	_____	_____	_____
		Subject No.3	_____	_____	_____
		Subject No.4	_____	_____	_____
		Subject No.5	_____	_____	_____
Subject No.6	_____	_____	_____		
Comments/Observations					

2.4.13 Water ingress and jump test		Regulations: LSA Code II/2.3.3; MSC.81(70) 1/3.1.9		
Test Procedure	Acceptance Criteria	Significant Test Data		
The test subjects should pre-wet their Anti-Exposure suit and then be weighed. Following a jump into the water from a height sufficient to totally immerse the body, each test subject should be weighed again.  Weighing should be performed on a machine accurate to ± 100g	The difference in the combined mass of the test subject and the suit should not exceed 500 g.	Mass difference ≤ 500g		
			Pass	Fail
		Subject No.1	_____	_____
		Subject No.2	_____	_____
		Subject No.3	_____	_____
		Subject No.4	_____	_____
		Subject No.5	_____	_____
Subject No.6	_____	_____		
Comments/Observations				

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
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	Lot/Serial Number: _____	Organization: _____	

2.4.14 Jump test	Regulations: LSA Code II/2.3.1.3.3; MSC.81(70) 1/3.1.10																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subjects should jump with the Anti-Exposure suit and lifejacket if required from a height of 4.5m vertically into the water. After the jump, the Anti - Exposure suit should be examined for damage or dislodging, and the test subject should be questioned concerning whether the suit caused any injury to the wearer.</p>	<p>The Anti - Exposure suit should not be damaged or dislodged in any way.</p> <p>The test subject should not be injured by the suit.</p> <p>The light, if fitted, should not injure the test subject.</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Pass</th> <th style="width: 20%; text-align: center;">Fail</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td colspan="3" style="padding-top: 10px;">Comments/Observations</td></tr> </tbody> </table>		Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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2.4.15 Leak test	Regulations: LSA Code II/2.3.1.1.1; MSC.81(70) 1/3.1.11																									
Test Procedure	Acceptance Criteria	Significant Test Data																								
<p>The test subject should pre-wet the Anti - Exposure suit and be weighed. The test subject should then be instructed to do one of the following:</p> <ol style="list-style-type: none"> <li>1. a period of flotation in calm water of 1h ; or</li> <li>2. swimming for 20 min for a distance of at least 200 m</li> </ol> <p>The test subject should be weighed again after the task.</p> <p>The weighing machine should be accurate to <math>\pm 100g</math>.</p>	<p>The ingress of water into the pre-wetted suit should not exceed a mass of 200g.</p>	<p>Indicate which alternative is used. <input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress <math>\leq 200g</math></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Pass</th> <th style="width: 20%; text-align: center;">Fail</th> </tr> </thead> <tbody> <tr><td>Subject No.1</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.2</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.3</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.4</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.5</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td>Subject No.6</td><td style="text-align: center;">_____</td><td style="text-align: center;">_____</td></tr> <tr><td colspan="3" style="padding-top: 10px;">Comments/Observations</td></tr> </tbody> </table>		Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____	Comments/Observations		
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<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

2.4.16Swimming and water emergent test		Regulations: LSA Code II/2.3.1.3.4; MSC.81(70) 1/3.1.12																																											
Test Procedure	Acceptance Criteria	Significant Test Data																																											
<p>All test subjects, each wearing a lifejacket but not the Anti-Exposure suit, should attempt to swim 25 m and board a liferaft or rigid platform with its surface 300 mm above the water surface.</p> <p>Test subjects who successfully complete this task should also perform it wearing the Anti-Exposure suit.</p> <p>If designed to be used with a lifejacket, then anti-exposure suit should be tested with the subject also wearing a lifejacket.</p>	<p>All qualified test subjects should be able to board the liferaft or platform while wearing the Anti-Exposure suit.</p>	<div>1)25m swim and boarding without lifejacket.</div> <table><thead><tr><th></th><th>Pass</th><th>Fail</th></tr></thead><tbody><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr></tbody></table> <div>2)25 m swim and boarding with immersion suit</div> <table><thead><tr><th></th><th>Pass</th><th>Fail</th></tr></thead><tbody><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr></tbody></table> <div>Comments/Observations</div>			Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____		Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____
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<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
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2.4.17 Oil resistance test		Regulations: LSA Code; MSC.81(70) 1/3.1.13																						
Test Procedure	Acceptance Criteria	Significant Test Data																						
<p>After all its apertures have been sealed an Anti - Exposure suit should be immersed for a period of 24 h under 100 mm head of diesel oil at normal room temperature.</p> <p>The surface oil should then be wiped off and the suit subjected to the test prescribed in 2.4.16</p>	<p>The ingress of water should not exceed a mass of 200g.</p>	<p>Indicate which alternative is used.</p> <div><input type="checkbox"/> Alternative 1<input type="checkbox"/> Alternative 2</div> <p>Water ingress ≤ 200g</p> <table><tr><td></td><td>Pass</td><td>Fail</td></tr><tr><td>Subject No.1</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.2</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.3</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.4</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.5</td><td><div></div></td><td><div></div></td></tr><tr><td>Subject No.6</td><td><div></div></td><td><div></div></td></tr></table> <p>Comments/Observations</p>			Pass	Fail	Subject No.1	<div></div>	<div></div>	Subject No.2	<div></div>	<div></div>	Subject No.3	<div></div>	<div></div>	Subject No.4	<div></div>	<div></div>	Subject No.5	<div></div>	<div></div>	Subject No.6	<div></div>	<div></div>
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<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.18 Alternative oil resistance test		Regulations: LSA Code; MSC.81(70) 1/3.1.14																				
Test Procedure		Acceptance Criteria																				
<p>In lieu of the test for oil resistance prescribed in 2.4.17 either of the following tests may be conducted.</p> <p>After all apertures have been sealed, the anti-exposure suit should be immersed for a period of 24 h under 100 mm head of diesel oil at normal room temperature if necessary using weights to keep suit submerged. Any surface oil should then be wiped off and the anti-exposure suit turned inside out. The suit should then be laid on a table suitable for collecting and draining off any leakage and be supported at the neck aperture by a suitable designed hanger. The suit should then be filled with water to neck level which should be 300mm above the table</p> <p>Representative samples of the exterior fabric and seams should be immersed under 100mm head of diesel oil for 24 h. After removal from the oil the samples should be wiped off before being subjected to the following tests: -</p> <p>1. a hydrostatic test of a 1m water head and</p> <p>2. a tensile test of representative seams</p>		<p>After 1h in this position there should be no leakage exceeding a mass of 200g</p> <p>The samples should successfully support 1 m head of water</p> <p>The seam strength should be not less than 150 N</p>																				
Significant Test Data																						
<p>Indicate which alternative is used.</p> <p><input type="checkbox"/> Alternative 1    <input type="checkbox"/> Alternative 2</p> <p>Water ingress ≤ 200g</p> <table><tr><td></td><td>Pass</td><td>Fail</td></tr><tr><td>Subject No.1</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____</td><td>_____</td></tr></table> <p>Strength &gt; 150N    Pass _____ Fail _____</p> <p>The samples should support a 1 m head of water</p> <p>Pass _____ Fail _____</p> <p>Comments/Observations</p>			Pass	Fail	Subject No.1	_____	_____	Subject No.2	_____	_____	Subject No.3	_____	_____	Subject No.4	_____	_____	Subject No.5	_____	_____	Subject No.6	_____	_____
	Pass	Fail																				
Subject No.1	_____	_____																				
Subject No.2	_____	_____																				
Subject No.3	_____	_____																				
Subject No.4	_____	_____																				
Subject No.5	_____	_____																				
Subject No.6	_____	_____																				

<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.4.19 Fire test		Regulations: LSA Code II/2.3.1.1.2; MSC.81(70) 1/3.1.15
Test Procedure	Acceptance Criteria	Significant Test Data
<p>A test pan 30x35x6cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to make a minimum total depth of 1 cm followed by enough petrol to make a minimum dept of 4 cm. The petrol should then be ignited and allowed to burn freely for 30 s. If necessary the anti - exposure suit should be draped over a hanger to ensure the whole of the suit is enveloped in the flames , with the bottom of the suit 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 s.</p>	<p>The anti-exposure suit should not sustain burning or continue melting after being removed from the flames.</p>	<p>Did the anti-exposure suit continue to burn or continue melting after being removed from the flames?</p> <p><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Comments/Observations</p>

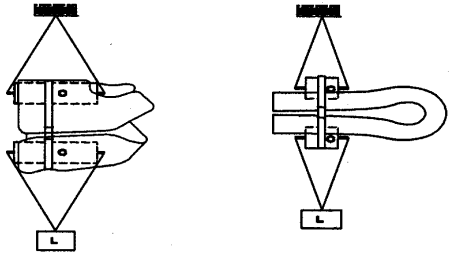
<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.4.20 Temperature cycling test		Regulations: LSA Code I/1.2.1.2; MSC.81(70) 1/3.1.16
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The following test should be carried out on two immersion suits</p> <p>The anti-exposure suits should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>.1 an 8 h cycle at +65°C to be completed in one day; and</p> <p>.2 the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>.3 an 8 h cycle at -30°C to be completed the next day; and</p> <p>.4 the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.</p>	<p>The Anti-Exposure suit's material should show no signs of damage such as shrinking, swelling dissolution or changes of mechanical qualities.</p>	<p>(See following page for test data)</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.21	Temperature cycling test - Test Data	Regulations: LSA Code I/1.2.1; MSC.81(70) 1/3.1.16		
	<i><b>HOT CYCLE</b></i>	<i><b>COLD CYCLE</b></i>		
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C	Date Out: _____ Time Out: _____ Duration : _____ hours

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

2.4.22 Buoyancy test	Regulations: LSA Code II/2.4.1.1.1; MSC.81(70) 1/3.1.17	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The Anti-exposure suit should have inherent buoyancy of at least 70 N</p> <p>The buoyancy of an anti-exposure suit designed to be worn without a lifejacket should be measured before and after 24 h complete submersion to just below the surface in fresh water.</p>	<p>The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy</p>	<p>Buoyancy 1      Buoyancy 2      % difference          _____ kg    _____ kg    _____ %</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>
2.4.23 Strength test	Regulations: LSA Code II; MSC.81(70) 1/3.1.18	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The anti-exposure suit should be immersed in water for a period of 2 min. The suit closed in the same manner as when worn by a person, a force of not less than 1350N should be applied for 30 min to the part of the suit that secures it to the body of the wearer.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Vest-type lifejacket      Yoke or over-the-head type lifejacket</p> <p>The anti-exposure suit may be cut if necessary to accommodate the test device.</p>	<p>The anti-exposure suit should not be damaged as a result of this test.</p>	<p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

<b>Anti-Exposure suits</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

2.4.24 Thermal protective test (General)		Regulations: LSA Code II/2.3.2.1; MSC.81(70) 1/3.2.1 – 3.2.4
Test Procedure	Acceptance Criteria	Significant Test Data
<p>The thermal protective qualities may be measured using a thermal manikin, when such a method is required by an Administration and has been demonstrated to provide test results which correlate satisfactorily in all aspects to test results using human subjects.</p> <p>If human subjects are used, they should be medically examined before being accepted for the tests. Each design of immersion suit is to be tested by test subjects specified in 2.3.1.5</p> <p>Where human subjects are used, the tests should always be conducted under the supervision of physician. Emergency resuscitation equipment should be available during all tests. For safety reasons, ECG should be monitored during every test. Testing should be stopped at the wish of the test subjects, or if the skin temperature of hand, foot or lumbar region should fall below 10° C, or if the attending physician considers it advisable.</p> <p>When testing with human subjects, continuous body core temperature (rectal temperature) and skin temperature of lumbar region, both hands, calves, foot (foot instep) and heels, should be measured. The accuracy of the measuring system should be 0.2°C. Appropriate corresponding measurements should be taken if a manikin is used in lieu of human subjects.</p> <p>Prior to tests, the same amount of water resulting from the jump test in paragraph 2.4.15 should be poured into the dry suit worn over the dry test clothing specified in 2.4.7 by the test subject lying down.</p>		Comments/Observations

<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.4.25 Thermal Protective test (Continued)	Regulations: LSA Code II/2.3.2.1.2; MSC.81(70) 1/3.2.9 & 3.2.10																																																																													
Test Procedure	Acceptance Criteria	Significant Test Data																																																																												
<p>Each test subject should wear an anti-exposure suit previously subjected to the water ingress and jump test in paragraph 2.4.13. Following a 1 h period of immersion, with hands gloved and hood donned, in circulating calm water at + 5°C, each test subject's body core temperature should not fall more than 2°C below the normal level of the subject's temperature.</p> <p>Immediately on leaving the water after completion of the test prescribed in 2.4.24 each test subject should be able to pick up a pencil as specified in paragraph 2.4.9 and write.</p> <p>The anti-exposure suit should be so constructed, that when worn as marked, the suit continues to provide sufficient thermal protection following one jump into the water which totally submerges the test subject and should ensure that when it is worn in calm water at a temperature of 5° C, the test subject's body core temperature does not fall at a rate of more than 1.5°C per hour, after the first 0.5 h.</p>		<p>Same mass of water which was the result from test 2.4.15, should be poured into the immersion suit</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 20%; text-align: center;">Beginning of test</th> <th style="width: 20%; text-align: center;">End of test</th> <th style="width: 30%; text-align: center;">Normal temperature</th> </tr> </thead> <tbody> <tr><td>Subject No 1</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subject No.2</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subject No.3</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subject No.4</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subject No.5</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>Subject No.6</td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td>Passed _____</td> <td colspan="2">Failed _____</td> <td></td> </tr> </tbody> </table> <p>Pick up a pencil and write after 1 h period of immersion:</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>Subject No 1</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 2</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 3</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 4</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 5</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 6</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr> <td>Passed _____</td> <td colspan="2">Failed _____</td> </tr> </tbody> </table> <p>Pick up a pencil and write after 6 h period of immersion:</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>Subject No 1</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 2</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 3</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 4</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 5</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr><td>Subject No 6</td><td><input type="checkbox"/> YES</td><td><input type="checkbox"/> NO</td></tr> <tr> <td>Passed _____</td> <td colspan="2">Failed _____</td> </tr> </tbody> </table> <p>See attached test sheets for temperatures during the immersion tests:</p> <p>Comments/Observations</p>				Beginning of test	End of test	Normal temperature	Subject No 1	_____	_____	_____	Subject No.2	_____	_____	_____	Subject No.3	_____	_____	_____	Subject No.4	_____	_____	_____	Subject No.5	_____	_____	_____	Subject No.6	_____	_____	_____	Passed _____	Failed _____			Subject No 1	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 2	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 3	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 4	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 5	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 6	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Passed _____	Failed _____		Subject No 1	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 2	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 3	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 4	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 5	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Subject No 6	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Passed _____	Failed _____	
	Beginning of test	End of test	Normal temperature																																																																											
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<b>Anti-Exposure suits</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

<b>2.4.26 Test sheets for temperatures during immersion tests</b>	<b>Regulations: LSA Code II/2.4.2.1.2; MSC.81(70) 1/3.2.13 &amp; 3.2.14</b>
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<b>SUBJECT 1</b>	<b>SUBJECT 2</b>	<b>SUBJECT 3</b>	<b>SUBJECT 4</b>	<b>SUBJECT 5</b>	<b>SUBJECT 6</b>
Rectal temp after 1 hr: _____	Rectal temp after 1 hr: _____	Rectal temp after 1 hr: _____	Rectal temp after 1 hr: _____	Rectal temp after 1 hr: _____	Rectal temp after 1 hr: _____
Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____	Skin temp at lumbar region after 1 hr : _____
Skin temp at left hand after 1 hr: _____	Skin temp at left hand after 1 hr: _____	Skin temp at left hand after 1 hr: _____	Skin temp at left hand after 1 hr: _____	Skin temp at left hand after 1 hr: _____	Skin temp at left hand after 1 hr: _____
Skin temp at right hand after 1 hr: _____	Skin temp at right hand after 1 hr: _____	Skin temp at right hand after 1 hr: _____	Skin temp at right hand after 1 hr: _____	Skin temp at right hand after 1 hr: _____	Skin temp at right hand after 1 hr: _____
Skin temp at calves after 1 hr: _____	Skin temp at calves after 1 hr: _____	Skin temp at calves after 1 hr: _____	Skin temp at calves after 1 hr: _____	Skin temp at calves after 1 hr: _____	Skin temp at calves after 1 hr: _____
Skin temp at left foot (foot instep) after 1 hr: _____	Skin temp at left foot (foot instep) after 1 hr: _____	Skin temp at left foot (foot instep) after 1 hr: _____	Skin temp at left foot (foot instep) after 1 hr: _____	Skin temp at left foot (foot instep) after 1 hr: _____	Skin temp at left foot (foot instep) after 1 hr: _____
Skin temp at right foot (foot instep) after 1 hr: _____	Skin temp at right foot (foot instep) after 1 hr: _____	Skin temp at right foot (foot instep) after 1 hr: _____	Skin temp at right foot (foot instep) after 1 hr: _____	Skin temp at right foot (foot instep) after 1 hr: _____	Skin temp at right foot (foot instep) after 1 hr: _____
Skin temp at left heel after 1 hr: _____	Skin temp at left heel after 1 hr: _____	Skin temp at left heel after 1 hr: _____	Skin temp at left heel after 1 hr: _____	Skin temp at left heel after 1 hr: _____	Skin temp at left heel after 1 hr: _____
Did the wearer's body core temperature fall at a rate more than 1,5°C per hour, after the first 0,5 h?	Did the wearer's body core temperature fall at a rate more than 1,5°C per hour, after the first 0,5 h?	Did the wearer's body core temperature fall at a rate more than 1,5°C per hour, after the first 0,5 h?	Did the wearer's body core temperature fall at a rate more than 1,5°C per hour, after the first 0,5 h?	Did the wearer's body core temperature fall at a rate more than 1,5°C per hour, after the first 0,5 h?	Did the wearer's body core temperature fall at a rate more than 1,5°C per hour, after the first 0,5 h?
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No



## **2.5 THERMAL PROTECTIVE AIDS**

### **EVALUATION AND TEST REPORT**

- 2.5.1 General data and specifications
- 2.5.2 Submitted drawings, reports and documents
- 2.5.3 Quality assurance
- 2.5.4 Visual inspection
- 2.5.5 Fabric test - Water resistance
- 2.5.6 Fabric test - Thermal conductance
- 2.5.7 Temperature cycling test
- 2.5.8 Test subjects
- 2.5.9 Test clothing
- 2.5.10 Donning test 1
- 2.5.11 Donning test 2 at low temperature
- 2.5.12 Discarding test
- 2.5.13 Oil resistance test

**2.5 THERMAL PROTECTIVE AIDS**  
**EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type</b>	
<b>Date</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

2.5.1	General Data and Specifications	Regulations: LSA Code II/2.3; MSC.81(70);
General Information		
<p><b>Construction Material:</b></p> <p>Fabric manufactured by:_____</p> <p>Type: _____</p> <p>Is the TPA of highly visible colour?</p>		<p><b>Donning instructions:</b></p> <p><input type="checkbox"/> YES      <input type="checkbox"/> NO</p> <p> </p> <p><input type="checkbox"/> YES      <input type="checkbox"/> NO</p>

<b>Thermal Protective Aids</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.5.2</b>	<b>Submitted drawings, reports and documents</b>
--------------	--

Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

<b>2.5.3 Quality Assurance</b>	<b>Regulations: -</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: -</p> <p>Quality Assurance Procedure: -</p> <p>Quality Assurance Manual: -</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>

<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.5.4 Visual Inspection		Regulations: LSA Code II/2.3; MSC. 81(70);	
Test Procedure	Acceptance Criteria	Significant Test Data	
Is the Thermal Protection Aid of high visible colour?		? Yes	?No
Does the Thermal Protection Aid cover the whole body of the wearer with the exception of the face?		? Yes	?No
If provided with arms, are the hand covered, or are permanently attached gloves provided?		? Yes	?No

<b>Thermal Protective Aids</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>2.5.5</b>	<b>Fabric Test - Water resistance</b>	<b>Regulations: LSA Code ; MSC.81(70) 1/3.3.1</b>
Test Procedure	Acceptance Criteria	Significant Test Data
The fabric from which the Thermal Protective Aids is constructed should be tested to determine its resistance to penetration by a 2m head of water.	The fabric should maintain its watertight integrity when supporting a column of water 2 m high.	<p>Does the material support a column of water of 2 m high</p> <p><input type="checkbox"/> YES    <input type="checkbox"/> NO</p> <p>Test method used:_____</p> <p>Comments/Observations</p>
<b>2.5.6</b>	<b>Fabric test - Thermal conductance</b>	<b>Regulations: LSA Code II/2.5.1; MSC.81(70) 1/3.3.2</b>
Test Procedure	Acceptance Criteria	Significant Test Data
The thermal conductance of the fabric of which the Thermal Protective Aid is manufactured should be measured.	The Fabric should have a thermal conductance of not more than 7800 W/m <sup>2</sup> K	<p>Passed _____ Failed _____</p> <p>All data is to be attached here.</p> <p>Comments/Observations</p>

<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.5.7 Temperature cycling test		Regulations: LSA Code II/1.2.2.2; MSC.81(70) 1/3.3.3
Test Procedure	Acceptance Criteria	Significant Test Data
<p>A thermal protective aid should be subjected to surrounding temperatures of -30<sup>0</sup>C and +65<sup>0</sup>C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>1. an 8 h cycle at +65<sup>0</sup>C to be completed in one day; and</p> <p>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>3. an 8 h cycle at -30<sup>0</sup>C to be completed the next day; and</p> <p>4. the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day;</p>	<p>The thermal protective aid should show no signs of damage such as shrinking, swelling dissolution or changes of mechanical qualities</p>	<p>See following page for test data.</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>



<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.5.7	Temperature cycling test – Test data	Regulations: LSA Code I/1.2.2.2; MSC.81(70) 1/3.3.3			
	<i><b>HOT CYCLE</b></i>	<i><b>COLD CYCLE</b></i>			
Cycle 1	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 2	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 3	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 4	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 5	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 6	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 7	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 8	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 9	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	
Cycle 10	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	Date In: _____ Time In : _____ Temperature : _____ °C Duration : _____ hours	Date Out: _____ Time Out: _____ Duration : _____ hours	

<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.5.8 Test subjects		Regulations: LSA Code II/2.5.2; MSC.81(70) 1/3.3.4				
Test Procedure	Acceptance Criteria		Significant Test Data			
For these tests a group of at least six test subjects of different ages, both male and female in the large, medium and small size range should be selected.	Test subject range:		Comments/Observations			
	Height	Weight		Male/Female	Height	Weight
	1.40 m – 1.60 m	1 person under 60 kg	Subject 1	_____	_____	_____
		1 person over 60 kg	Subject 2	_____	_____	_____
	1.60 m – 1.80 m	1 person under 70 kg	Subject 3	_____	_____	_____
		1 person over 70 kg	Subject 4	_____	_____	_____
	over 1.80 m	1 person under 80 kg	Subject 5	_____	_____	_____
		1 person over 80 kg	Subject 6	_____	_____	_____
2.5.9 Test clothing		Regulations: LSA Code II/2.5; MSC.81(70) 1/3.3.5, 3.2.6 & 3.2.8				
Test Procedure	Acceptance Criteria		Significant Test Data			
The test subjects should wear a standard range clothing consisting of			Did all test subject use the specified test clothing			
			<input type="checkbox"/> YES <input type="checkbox"/> NO			
1 underwear (short sleeved, short legged)			Comments/Observations			
2 shirt(long sleeved)						
3 trousers(not woollen, and woollen socks						
4 in addition to the clothing the test subjects should wear two woollen pullovers during the tests prescribed in 2.5.10; 2.5.11 and 2.5.12.						

<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.5.10 Donning test (1)		Regulations: LSA Code II/2.5.2.; MSC.81(70) 1/3.3.6				
Test Procedure	Acceptance Criteria		Significant Test Data			
Following a demonstration, the test subjects should be able to unpack and don the Thermal Protection Aids over a lifejacket when seated in a survival craft or a rescue boat.	The test subjects should be able to unpack and don the Thermal Protection Aides.		Time	Passed	Failed	
			Subject No.1	_____ sec	_____	_____
			Subject No.2	_____ sec	_____	_____
			Subject No.3	_____ sec	_____	_____
			Subject No.4	_____ sec	_____	_____
			Subject No.5	_____ sec	_____	_____
			Subject No.6	_____ sec	_____	_____
			Comments/Observations			
2.5.11 Donning test (2) at low temperature		Regulations: LSA Code II/2.5.3; MSC.81(70) 1/3.3.7				
Test Procedure	Acceptance Criteria		Significant Test Data			
The Thermal Protective aid should be capable of being unpacked and donned at an ambient temperature of – 30° C. Before the donning test the thermal protective aid should be kept in a refrigerated chamber at a temperature of -30°C for 24 h.	The test subjects should be able to successfully unpack and don the thermal protective aid.		Time	Passed	Failed	
			Subject No.1	_____ sec	_____	_____
			Subject No.2	_____ sec	_____	_____
			Subject No.3	_____ sec	_____	_____
			Subject No.4	_____ sec	_____	_____
			Subject No.5	_____ sec	_____	_____
			Subject No.6	_____ sec	_____	_____
			Comments/Observations			

<b>Thermal Protective Aids</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

2.5.12 Discarding Test		Regulations: LSA Code II/2.5; MSC.81(70) 1/3.3.8																																	
Test Procedure	Acceptance Criteria	Significant Test Data																																	
If the thermal protective aid impairs the ability of the test subjects to swim, it should be demonstrated that it can be discarded by the test subjects, when immersed in water, in not more than 2 min.	The test subject should be able to complete this task in less than 2 min.	<table><thead><tr><th></th><th>Time</th><th>Passed</th><th>Failed</th></tr></thead><tbody><tr><td>Subject No.1</td><td>_____ sec</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.2</td><td>_____ sec</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.3</td><td>_____ sec</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.4</td><td>_____ sec</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.5</td><td>_____ sec</td><td>_____</td><td>_____</td></tr><tr><td>Subject No.6</td><td>_____ sec</td><td>_____</td><td>_____</td></tr><tr><td colspan="4">Comments/Observations</td></tr></tbody></table>			Time	Passed	Failed	Subject No.1	_____ sec	_____	_____	Subject No.2	_____ sec	_____	_____	Subject No.3	_____ sec	_____	_____	Subject No.4	_____ sec	_____	_____	Subject No.5	_____ sec	_____	_____	Subject No.6	_____ sec	_____	_____	Comments/Observations			
	Time	Passed	Failed																																
Subject No.1	_____ sec	_____	_____																																
Subject No.2	_____ sec	_____	_____																																
Subject No.3	_____ sec	_____	_____																																
Subject No.4	_____ sec	_____	_____																																
Subject No.5	_____ sec	_____	_____																																
Subject No.6	_____ sec	_____	_____																																
Comments/Observations																																			

2.5.13 Oil resistance test		Regulations: LSA Code II/1.2.2.4; MSC.81(70) 1/3.3.9	
Test Procedure	Acceptance Criteria	Significant Test Data	
<p>After all its apertures have been sealed, a thermal protective aid should be immersed under 100 mm head of diesel oil for 24 h.</p> <p>The surface oil should then be wiped off and it should be established the thermal conductance of the material.</p>	After this test the thermal protective aid should show no signs of damage, such as shrinking, cracking, swelling, dissolution or change of mechanical qualities. The thermal conductance should be not more than 7800 W/m² K	<p>Is the thermal conductance of the thermal protective aid not more than 7800 W/m² K?</p> <p><input type="checkbox"/> YES</p> <p><input type="checkbox"/> NO</p> <p>Is there any sign of damage, such as shrinking, cracking swelling, dissolution or change of mechanical qualities?</p> <p><input type="checkbox"/> YES</p> <p><input type="checkbox"/> NO</p> <p>Comments/Observations</p>	

### **3 VISUAL DISTRESS SIGNALS**

#### **3.1 ROCKET PARACHUTE FLARES**

##### **EVALUATION AND TEST REPORT**

- 3.1.1 Submitted drawings, reports and documents
  - 3.1.1.1 Quality assurance
  - 3.1.1.2 Visual inspection
  - 3.1.1.3 General Data and Specifications
- 3.1.2 Temperature cycling test
- 3.1.3 Low Temperature Conditioning Test
- 3.1.4 High Temperature Conditioning Test
- 3.1.5 Humidity Conditioning Test
- 3.1.6 Water and Corrosion Resistance Test
  - 3.1.6.1 1 m immersion for 24 h test
  - 3.1.6.2 10 cm immersion for 5 min test
  - 3.1.6.3 Salt spray test
- 3.1.7 Handling Safety
  - 3.1.7.1 2 m Drop Test
  - 3.1.7.2 Immersion suit glove test
- 3.1.8 Luminous Intensity Test
- 3.1.9 Safety Inspection
- 3.1.10 Liferaft Drop Test

**3.1 ROCKET PARACHUTE FLARES**  
**EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type/Model</b>	
<b>Date of Approval</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organization</b>	

<b>Rocket Parachute Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.1.1 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Rocket Parachute Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.1.1.1 Quality Assurance	Regulations: - MSC.81(70) 2/1.2
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: -</p> <p>Quality Assurance Procedure: -</p> <p>Quality Assurance Manual: -</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>



<b>Rocket Parachute Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.1.1.2 Visual inspection		Regulations: LSA Code I/1.2.2 & III/3.1	
Test Procedure	Acceptance Criteria	Significant Test Data	
Visual examination:-	Rocket Parachute Flares should:-		
Approval markings	be clearly marked with approval information including the Administration which approved it, date of manufacture and expiry and operational restrictions, markings are to be indelible;	Passed _____	Failed _____
Operating instructions.	be provided with brief instructions or diagrams clearly illustrating the use of the rocket parachute flare printed on the casing;	Passed _____	Failed _____
Outer casing.	not depend on adhesive tapes or plastic envelopes for its water-resistant properties	Passed _____	Failed _____
Comfort.	be so designed as not to cause discomfort to the person holding the casing when used in accordance with the manufacturers instructions;	Passed _____	Failed _____
Operation	be so constructed that the end from which the rocket is ejected can be positively identified by day or night;	Passed _____	Failed _____
Ignition System.	be fitted with an integral means of ignition;	Passed _____	Failed _____
Life Time	The administration should determine the period of acceptability of the unit which are subject to deterioration with age.	Passed _____	Failed _____
		Comments/Observations	

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.1.3 General Data and Specifications	Regulations: LSA Code 1.2; MSC.81(70) Pt 1/4.6	
General Information	Dimensions	Weight
<p>Construction Material:</p> <p>Casing: _____</p> <p>Top cover (If applicable) : _____</p> <p>Bottom Cover (If applicable) : _____</p> <p>Method of Ignition _____</p> <p>Operational Safety Delay (if Applicable) _____</p> <p>Parachute _____ Material _____</p> <p>Acceptable life of the item _____ yrs</p>	<p>Dimensions:</p> <p>Length of Casing: _____</p> <p>Diameter of Casing: _____</p> <p>Parachute Dimensions: _____</p> <p>Number of attachment Cords : _____</p> <p>Diameter of Line: _____</p>	<p>Design Weight: _____</p> <p>Weight As Tested: _____</p> <p>Weight of Flare Material _____</p> <p>Weight of Rocket Charge _____</p> <p>Comments/Observations</p>

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

TEST ITEMS CONDITIONING SEQUENCE	SPECIMEN NUMBER									REFERENCES	REMARKS
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-28	MSC81(70)	
Measuring dimensions and mass	A	A	A	A	A	A	A	A	A		
Temperature cycling test (3.1.2)	B									4.2.1	
Low temperature conditioning (3.1.3)		B								4.2.2	
High temperature conditioning (3.1.4)			B							4.2.3	
Humidity conditioning (3.1.5)				B						4.2.4	
1 m immersion for 24 hours (3.1.6.1)					B					4.3.1	
100 mm for 5 minutes (3.1.6.2)						B				4.3.2	
Salt water spray (3.1.6.3)							B			4.3.3	
2 m Drop Test (3.1.7.1)								B		4.4.1	
Safety inspection (3.1.10)	C	C	C	C	C	C	C	C		4.5	
Operation at ambient temperature	D				D	D	D	D		4.2.1, 4.3.1, 4.3.2, 4.3.3 & 4.4.1	

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

Specimen No. ->	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-28	References	Remarks
Operate at conditioning Temperature		D	D	D						4.2.2, 4.2.3 & 4.2.4	
Operational test using immersion suit glove (3.1.7.2)	E				E			E		/4.4.2	Use specimens # 2,#14 and #23
Vertical firing height, descent speed, burn time. (Note 1)			E		E	E	E			4.6.1	
45° firing to horizontal. (Note 2)	E	E		E				E		4.6.3	
Rocket recoil test for hand held only. (Note 3)	E	E	E	E	E	E	E	E		4.6.4	
Flare material test Colour and luminosity (3.1.9)										4.6.2	Additional flares may be used to measure the luminous intensity and may be carried out by an independent laboratory acceptable to the administration & report submitted.
Chute examination after recovery. (Note 4)	F	F	F	F	F	F	F	F		LSA. Code Chapter II, Para 3.1.2.5	
Liferaft Drop Test (4.2.4)									G	LSA Code Chapter IV Para 4.1.1.2	The liferaft manufacturer should complete this form

Note: The letters in the above 'boxes' refer to the sequence of testing of each specimen Rocket Parachute Flare.

Note 1. Not all samples marked need to be fired at 90°. A representative sample of at least 18 specimens should be so assessed, so that a representative descent rate can be found.

Note 2. Not all samples marked need to be fired at 45°. A representative sample of at least 3 specimens should be so assessed.

Note 3. Not all samples need to be recoil tested. A representative sample of at least 3 rockets should be so assessed by hand firing.

Note 4. It is accepted that all parachutes may not be recoverable - as many as possible should be recovered and inspected for damage.

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.2 Temperature cycling test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/1.2.1 & 4.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>The three specimens of parachute rocket flares should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <ol style="list-style-type: none"> <li>an 8 h cycle at +65°C to be completed in one day; and</li> <li>the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</li> <li>an 8 h cycle at -30°C to be completed the next day; and</li> <li>the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day;</li> </ol> <p>The three parachute rockets after completing temperature cycling should function effectively at ambient temperature</p> <p>Samples 1 and 2 should be fired vertically. Sample 3 should be fired at an angle of 45°.</p>	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <ol style="list-style-type: none"> <li>It should be established by means of accurate measuring instruments that the parachute flares of specimens 1 and 2 are ejected at a height of not less than 300 m.</li> <li>The height of which the flare burns out and the burning period should also be measured.</li> <li>It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.</li> <li>Specimen 3 should function efficiently but need not reach a height of 300 metres.</li> <li>If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.</li> <li>It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.</li> </ol>	1	2	3
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90°		
				N/A
		Burn out height of flare (metres)		
				N/A
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
				N/A
		Operation at 45° (Pass/Fail)		
		N/A	N/A	
		Height reached (metres)		
				N/A
		Parachute condition (Pass/Fail)		
		Recoil minimal (Pass/Fail)		
		Comments/Observations		
		Passed _____ Failed _____		

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.3 Low temperature conditioning test		Regulations: LSA Code I/1.2 & .III/3.1; MSC.81(70) 1/4.2.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three parachute rockets should be subjected to a temperature of -30°C for at least 48 h .  Specimen 4 and 5 should be fired vertically. Specimen6 should be fired at an angle of 45°.	After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.  1. It should be established be by means of accurate measuring instruments that the parachute flares of specimen 4 and 5 are ejected at a height of not less than 300 m.  2. The height of which the flare burns out and the burning period should also be measured.  3. It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.  4. Specimen 6 should function efficiently but need not reach a height of 300 metres.  5. If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.  6. It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.	4	5	6
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90 <sup>0</sup>		
				N/A
		Burn out height of flare (metres)		
				N/A
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
				N/A
		Operation at 45 <sup>0</sup> (Pass/Fail)		
		N/A	N/A	
		Height reached (metres)		
				N/A
		Parachute condition (Pass/Fail)		
Recoil minimal (Pass/Fail)				
Comments/Observations				
Passed _____ Failed _____				



<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.5 Humidity conditioning test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.2.4		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of parachute rockets should be subjected to a temperature of +65°C and 90% relative humidity for at least 96 h, followed by ten days at 20°C to 25°C at 65% relative humidity .</p> <p>Specimen 10 and 11 should be fired vertically. Specimen 12 should be fired at an angle of 45°.</p>	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <ol style="list-style-type: none"> <li>It should be established by means of accurate measuring instruments that the parachute flares of specimens 10 and 11 are ejected at a height of not less than 300 m.</li> <li>The height of which the flare burns out and the burning period should also be measured.</li> <li>It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.</li> <li>Specimen 12 should function efficiently but need not reach a height of 300 metres.</li> <li>If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.</li> <li>It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.</li> </ol>	10	11	12
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90°		
				N/A
		Burn out height of flare (metres)		
				N/A
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
				N/A
		Operation at 45° (Pass/Fail)		
		N/A	N/A	
		Height reached (metres)		
				N/A
		Parachute condition (Pass/Fail)		
		Recoil minimal (Pass/Fail)		
		Comments/Observations		
		Passed _____ Failed _____		



<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.6.11 m immersion for 24 hours test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.3.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three parachute rockets should be immersed horizontally for 24 h under 1 m of water .  The three rockets should be fired vertically.	After the test, each rocket should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.  1. It should be established be by means of accurate measuring instruments that the parachute flares of the three rockets are ejected at a height of not less than 300 m.  2. The height of which the flare burns out and the burning period should also be measured.  3. It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.  4. If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.  5. It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.	13	14	15
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90 <sup>0</sup>		
		Burn out height of flare (metres)		
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
		Parachute condition (Pass/Fail)		
		Recoil minimal (Pass/Fail)		
		Comments/Observations		
		Passed _____ Failed _____		

<b>Rocket Parachute Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.1.6.210 cm immersion for 5 min test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.3.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three parachute rockets should be immersed in the ready to fire condition for 5 min under 10 cm of water .  The three rockets should be fired vertically.	After the test, each rocket should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.  1. It should be established be by means of accurate measuring instruments that the parachute flares of the three rockets are ejected at a height of not less than 300 m. The height of which the flare burns out and the burning period should also be measured. It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.  2. If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.  3. It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.	16	17	18
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90 <sup>0</sup>		
		Burn out height of flare (metres)		
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
		Parachute condition (Pass/Fail)		
		Recoil minimal (Pass/Fail)		
Comments/Observations				
Passed _____ Failed _____				

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.6.3Salt spray test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.3.3		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of parachute rockets should be subjected to a salt spray (5% Natrium Chloride solution) at a temperature of +35±3 °C for at least 100 h.  The three rockets should be fired vertically.  				

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.7.12 m Drop Test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.3.3		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three parachute rockets should be dropped in turn end-on and horizontally from a height of 2 m on to a steel plate about 6 mm thick cemented on to a concrete floor. They should remain in a safe condition after this test.  Specimen 10 and 11 should be fired vertically. Specimen 12 should be fired at an angle of 45°.	After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.  1. It should be established by means of accurate measuring instruments that the parachute flares of specimens 22 and 23 are ejected at a height of not less than 300 m.  2. The height of which the flare burns out and the burning period should also be measured.  3. It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.  4. Specimen 24 should function efficiently but need not reach a height of 300 metres.  5. If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.  6. It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.	22	23	24
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90 <sup>0</sup>		
				N/A
		Burn out height of flare (metres)		
				N/A
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
				N/A
		Operation at 45 <sup>0</sup> (Pass/Fail)		
		N/A	N/A	
		Height reached (metres)		
				N/A
		Parachute condition (Pass/Fail)		
Recoil minimal (Pass/Fail)				
Comments/Observations				
Passed _____ Failed _____				

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.7.2 Immersion suit glove test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.4.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three parachute rockets should be activated in accordance with the manufacturer's operating instructions by an operator wearing an insulated buoyant immersion suit or the gloves taken from an insulated buoyant immersion suit to establish that they can be operated effectively without injury to the operator, or any person in close proximity during firing or burning.  The three rockets should be fired vertically.	After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.  1. It should be established by means of accurate measuring instruments that the parachute flares of the three rockets are ejected at a height of not less than 300 m.  2. The height of which the flare burns out and the burning period should also be measured.  3. It should be established from these measurements that the rate of descent is not more than 5 m/s and the burning period is not less than 40 s.  4. If the rocket is hand held when operated, it should be demonstrated that its recoil is minimal.  5. It should be determined by examination that the flare has not damaged its parachute or attachments whilst it was burning.	2	14	23
		Condition after conditioning (Pass/Fail)		
		Ejection height of flare (metres) Operation 90 <sup>0</sup>		
		Burn out height of flare (metres)		
		Burn time of flare (sec)		
		Descent rate of flare (m/s)		
		Parachute condition (Pass/Fail)		
		Recoil minimal (Pass/Fail)		
Comments/Observations				
Passed _____ Failed _____				

<b>Rocket Parachute Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.1.8 Luminous intensity test		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.6.2	
Test Procedure	Acceptance Criteria	Significant Test Data	
Laboratory testing of the rocket parachute flare should establish that it will burn with the required luminous intensity and colour.	The testing laboratory report should confirm that the average luminous intensity of the flare is at least 30,000 Cd for a period of not less than 40 seconds, at temperatures from -30°C to +65°C. The measured chromaticity co-ordinates should be within the boundaries of the area of the diagram as per CIE. The boundaries of the red light are given by following corner co-ordinates:  <div><div><math>x_1 = 0.61</math> <math>y_1 = 0.3</math></div><div><math>x_2 = 0.69</math> <math>y_2 = 0.39</math></div></div>	Laboratory Testing report	
		Report acceptable (Yes/No)	
		Luminous intensity levels achieved at – 30°C ____ KCd	
		Burning time of Flare _____ sec	
		Colour co-ordinates: x..... y.....	
		Luminous intensity levels achieved at +20°C ____ KCd	
		Burning time of Flare _____ sec	
		Colour co-ordinates: x..... y.....	
		Luminous intensity levels achieved at + 65°C ____ KCd	
		Burning time of Flare _____ sec	
Colour co-ordinates: x..... y.....			
Comments/Observations.			
Passed _____ Failed _____			

<b>Rocket Parachute Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.1.9 Safety inspection		Regulations: LSA Code I/1.2 & III/3.1; MSC.81(70) 1/4.5	
Test Procedure		Acceptance Criteria	Significant Test Data
It should be established by visual inspection that the rocket parachute flare:			
1	is indelibly marked with clear and precise instructions on how it should be operated and that the danger end can be identified by day or night;	Clear and precise operating instructions are marked on the parachute rocket flare and the parachute rocket flare clearly identifies the danger end.	Markings and identification of ends acceptable  Passed _____ Failed _____
2	can, if hand operated, be operated from the bottom (safe end) or that it contains an operational safety delay of 2 seconds;	If operated from the top the time delay is not to be less than 2 s.	Time delay if operated from the top _____ sec
3	has a simple and integral means of ignition which requires the minimum of preparation and can be readily operated in adverse conditions without external aid and with wet, cold or gloved hands;	It has a simple means of ignition and can be operated by cold, wet and gloved hands.	Operation of specimen when wet, cold and gloved hands.  Passed _____ Failed _____
4	does not depend on adhesive tapes or plastic envelopes for its water resistant properties; and	Adhesive tapes or plastic envelopes are not used to maintain water-resistant properties.	Water resistant without the use of envelopes or adhesive tape.  Passed _____ Failed _____
5	can be indelibly marked with means of determining its age.	Date of manufacturing and date of expiry indelible printed on the outside.	Indelible date stamped  Passed _____ Failed _____  Comments/Observations

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## **3.2 HAND FLARES**

### **EVALUATION AND TEST REPORT**

- 3.2.1 Submitted drawings, reports and documents
  - 3.2.1.1 Quality assurance
  - 3.2.1.2 Visual inspection
  - 3.2.1.3 General Data and Specifications
- 3.2.2 Temperature cycling test
- 3.2.3 Low Temperature Conditioning Test
- 3.2.4 High Temperature Conditioning Test
- 3.2.5 Humidity Conditioning Test
- 3.2.6 Water and Corrosion Resistance Test
  - 3.2.6.1 1 meter immersion for 24 hours test
  - 3.2.6.2 100 mm immersion for 5 minutes test
  - 3.2.6.3 Salt spray Test
- 3.2.7 Handling Safety
  - 3.2.7.1 2 m Drop Test
  - 3.2.7.2 Immersion suit glove test
  - 3.2.7.3 Handling safety immersion test
- 3.2.8 Heptane Test
- 3.2.9 Luminous Intensity Test
- 3.2.10 Liferaft Drop Test
- 3.2.11 Safety Inspection

### 3.2 HAND FLARES

#### EVALUATION AND TEST REPORT

<b>Manufacturer</b>	
<b>Type/Model</b>	
<b>Date of Approval</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organisation</b>	

<b>Hand Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.2.1 Submitted drawings, reports and documents			
Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Hand Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

<b>3.2.1.1 Quality Assurance</b>	<b>Regulations: - MSC.81(70) 2/1.2</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: - _____</p> <p>Quality Assurance Procedure: - _____</p> <p>Quality Assurance Manual: - _____</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.1.2 Visual inspection	Regulations: LSA Code I/1.2.2
Test Procedure	Acceptance Criteria
Visual examination:-	Red Hand Flares should:-
Approval markings	be clearly marked with approval information including the Administration which approved it, date of manufacture and expiry and operational restrictions, markings are to be indelible;
Operating instructions.	be provided with brief instructions or diagrams clearly illustrating the use of the hand flare printed on the casing;
Outer casing.	not depend on adhesive tapes or plastic envelopes for its water-resistant properties
Comfort.	be so designed as not to cause discomfort to the person holding the casing when used in accordance with the manufacturers instructions;
Operation	be so constructed that the end from which the flare is burning can be positively identified by day or night;
Ignition System.	be fitted with an integral means of ignition;
Life of Hand Flare	The administration should determine the period of acceptability of the unit which are subject to deterioration with age.
	Comments/Observations

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.1.3 General Data and Specifications	Regulations: LSA Code 1.2; MSC.81(70) 1/4.6	
General Information	Dimensions	Weight
<p>Construction Material:</p> <p>Casing: _____</p> <p>Top cover (If applicable) : _____</p> <p>Bottom Cover (If applicable) : _____</p> <p>Method of Ignition _____</p> <p>Operational Safety Delay (if Applicable) _____</p> <p>Acceptable life of the item _____ yrs</p>	<p>Dimensions:</p> <p>Length of Casing: _____</p> <p>Diameter of Casing: _____</p>	<p>Design Weight: _____</p> <p>Weight As Tested: _____</p> <p>Weight of Flare Material _____</p> <p>Comments/Observations</p>

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

TEST ITEMS CONDITIONING SEQUENCE	SPECIMEN NUMBER										REFERENCES	REMARKS
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	MSC81(70)		
Measuring dimensions and mass	A	A	A	A	A	A	A	A				
Temperature cycling test (3.2.2)	B									4.2.1		
Low temperature conditioning (3.2.3)		B								4.2.2		
High temperature conditioning (3.2.4)			B							4.2.3		
Humidity conditioning (3.2.5)				B						4.2.4		
1 meter immersion for 24 hours (3.2.6.1)					B					4.3.1		
100 mm for 5 minutes (3.2.6.2)						B				4.3.2		
Salt water spray (3.2.6.3)							B			4.3.3		
2 m Drop Test (3.2.7.1)								B		4.4.1		
Safety inspection (3.2.10)	C	C	C	C	C	C	C	C	C	4.5		
Operation at ambient temperature	D				D	D	D	D	D	4.2.1, 4.3.1, 4.3.2, 4.3.3 & 4.4.1		

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

Specimen No. ->	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-30	References	Remarks
Operate at conditioning Temperature		D	D	D						4.2.2, 4.2.3 & 4.2.4	
Operational test using immersion suit glove (3.2.7.2)								E		/4.4.2	
Burning time of flare	E	E	E	E	E	E	E	E		4.7.1	
Flare immersion test under water (3.2.7.3)			E							4.7.1	
Heptane test (3.2.8)								E		4.7.3	
Flare material test Colour and luminosity (3.2.9)									F	4.7.2	May be carried out by an independent laboratory acceptable to the administration & report submitted. Use specimens 29 to 30
Liferaft Drop Test									G	LSA Code Chapter IV Para 4.1.1.2	The liferaft manufacturer should complete this form

Note: The letters in the above `boxes' refer to the sequence of testing of each specimen Hand Flare.



<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.2 Temperature cycling test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/1.2.1 & 4.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>The three specimens of hand flares should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after Each other and the following procedure, repeated for a total of 10 cycles, is acceptable:</p> <p>1. an 8 h cycle at +65°C to be completed in one day; and</p> <p>2. the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>3. an 8 h cycle at -30°C to be completed the next day; and</p> <p>4. the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day;</p> <p>The three hand flares after completing temperature cycling should function effectively at ambient temperature</p>	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <p>The three flares should burn for a period of not less than 1 minute.</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions</p>	1	2	3
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		Comments/Observations		
Passed _____ Failed _____				

Hand Flares	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.2.3Low temperature conditioning test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of hand flare should be subjected to a temperature of -30°C for at least 48 h. and should then function at that temperature.	After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.  The three flares should burn for a period of not less than 1 minute  The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.	4	5	6
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		Comments/Observations		
		Passed _____ Failed _____		

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.4 High temperature conditioning test	Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.2			
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of hand flares should be subjected to a temperature of +65°C for at least 48 h and then function effectively at that temperature.</p>	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <p>The three flares should burn for a period of not less than 1 minute</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.</p>	7	8	9
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		<p>Comments/Observations</p> <p>Passed _____ Failed _____</p>		

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.5 Humidity conditioning test	Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.2.4			
Test Procedure	Acceptance Criteria			
<p>Three specimens of hand flares should be subjected to a temperature of +65°C and 90% relative humidity for at least 96h, followed by ten days at 20°C to 25°C at 65% relative humidity.</p>	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <p>The three flares should burn for a period of not less than 1 minute.</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions</p>	Significant Test Data		
		10	11	12
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
<p>Comments/Observations</p> <p>Passed _____ Failed _____</p>				

<b>Hand Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.2.6.1      1 meter immersion for 24 hours test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.3.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of hand flares should be immersed horizontally for 24 h under 1 m of water.	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <p>The three flares should burn for a period of not less than 1 minute</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions</p>	13	14	15
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		Comments/Observations		
<p>Passed _____ Failed _____</p>				

<b>Hand Flares</b>	Manufacturer:_____ Date:_____ Time:_____
	Model:_____ Surveyor:_____
	Lot/Serial Number:_____ Organization:_____

3.2.6.2      100 mm immersion for 5 min test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.3.2			
Test Procedure	Acceptance Criteria		Significant Test Data		
Three specimens of hand flares should be immersed horizontally in the ready to fire condition for 5 min under 100 mm of water.	After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.  The three flares should burn for a period of not less than 1 minute.  The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.		16	17	18
			Condition (Pass/Fail)		
			Burn time (sec)		
			Time delay (if applicable) (sec)		
			Comments/Observations		
		Passed _____      Failed _____			

<b>Hand Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.2.6.3 Salt Spray Test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.3.3		
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of hand flares should be subjected to a salt spray (5% sodium chloride solution) at a temperature of <math>+35\pm 3^{\circ}\text{C}</math> for at least 100 h.</p> <p>Note: Sodium and Sodium are the same compound</p>	<p>After the test, each specimen should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and should then function at ambient temperature.</p> <p>The three flares should burn for a period of not less than 1 minute</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.</p>	19	20	21
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		Comments/Observations		
		<p>Passed _____ Failed _____</p>		

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.7.1 2 m Drop Test	Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.3.3			
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three specimens of hand flare should be dropped in turn on both ends and horizontally from a height of 2 m on to a steel plate about 6 mm thick cemented on to a concrete floor.</p>	<p>After the test each hand flare should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities and remain operable and should subsequently be operated and function effectively.</p> <p>They should burn for a period of not less than 1 minute.</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions</p>	22	23	24
		Condition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		<p>Comments/Observations</p> <p>Passed _____ Failed _____</p>		



<b>Hand Flares</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.2.7.2	Immersion suit glove test	Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70)		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of hand flare should be activated in accordance with the manufacturer's operating instructions by an operator wearing an insulated buoyant immersion suit or the gloves taken from an insulated buoyant immersion suit.	The three specimens should be capable of being operated effectively without injury to the operator, or any person in close proximity during firing or burning, they must burn for a period of not less than 1 minute  The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.	19	20	21
		Operation using glove (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		Type of Glove used _____		
Comments/Observations				
Passed _____ Failed _____				

Hand Flares	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.2.7.3 Handling safety Immersion test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.7.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three hand flares should be activated and should burn period of not less than 1 min. After burning for 30 s each flare should be immersed horizontally under 100 mm of water for a period of 10 and should continue to burn for at least a further 20 s.	The three specimens should operate effectively under water without injury to the operator for a period of 10 s, the flare should burn for a period of not less than 1 min.  The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.	7	8	9
		Under-water operation (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
		Comments/Observations		
		Passed _____ Failed _____		

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.8 Heptane test	Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.7.3			
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>Three hand flares should be activated at 45° 1.2 m above a test pan 1 m square containing 2 litres of heptane floating on a layer of water. The test should be conducted at an ambient temperature of +20°C to +25°C. The flare should be allowed to burn completely.</p>	<p>The three specimens should not ignite the heptane. The flare should burn for a period of not less than 1 minute.</p> <p>The hand flare should not cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.</p>	22	23	24
		Heptane ignition (Pass/Fail)		
		Burn time (sec)		
		Time delay (if applicable) (sec)		
<p>Comments/Observations</p> <p>Passed _____ Failed _____</p>				

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.9 Luminous intensity test		Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70)	
Test Procedure	Acceptance Criteria	Significant Test Data	
Laboratory testing of the flare should establish that it will burn with the required luminous intensity and colour.	The testing laboratory report should confirm that the average luminous intensity of the flare is at least 15,000 Cd for a period of not less than 1 minute, at temperatures from -30°C to +65°C. The measured chromaticity co-ordinates should be within the boundaries of the area of the diagram as per CIE. The boundaries of the red light are given by following corner co-ordinates:  <div><div><math>x_1 = 0.61</math> <math>y_1 = 0.3</math></div><div><math>x_2 = 0.69</math> <math>y_2 = 0.39</math></div></div>	Laboratory Testing report No.: _____	
		Report acceptable (Yes/No): _____	
		Luminous intensity levels achieved at – 30°C ____ KCd	
		Burning time of Flare _____ sec	
		Colour co-ordinates: x..... y.....	
		Luminous intensity levels achieved at +20°C ____ KCd	
		Burning time of Flare _____ sec	
		Colour co-ordinates: x..... y.....	
		Luminous intensity levels achieved at + 65°C ____ KCd	
		Burning time of Flare _____ sec	
Colour co-ordinates: x..... y.....			
Comments/Observations			
Passed _____ Failed _____			

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.2.10 Liferaft drop test		Regulations: LSA Code 1.2 & 4.1.1.2			
Test Procedure	Acceptance Criteria	Significant Test Data			
The liferaft in the operationally packed condition should be suspended and then dropped from a height of 18 m into the water. If the liferaft is to be stowed at a height greater than 18 m above the waterline in the lightest seagoing condition, it should be dropped from the height at which it is to be stowed.  <					

<b>Hand Flares</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

3.2.11 Safety Inspection	Regulations: LSA Code I/1.2 & III/3.2; MSC.81(70) 1/4.5	
Test Procedure	Acceptance Criteria	Significant Test Data
<p>It should be established by visual inspection that the hand flare:</p> <ol style="list-style-type: none"> <li>1. is indelibly marked with clear and precise instructions on how it should be operated and that the danger end can be identified by day or night;</li> <li>2. can, if hand operated, be operated from the bottom (safe end) or that it contains an operational safety delay of 2 seconds;</li> <li>3. has a simple and integral means of ignition which requires the minimum of preparation and can be readily operated in adverse conditions without external aid and with wet, cold or gloved hands;</li> <li>4. does not depend on adhesive tapes or plastic envelopes for its water resistant properties; and</li> <li>5. can be indelibly marked with means of determining its age.</li> </ol>	<p>Clear and precise operating instructions are marked on the hand flare and the hand flare clearly identifies the danger end.</p> <p>If operated from the top the time delay is not to be less than 2 s.</p> <p>It has a simple means of ignition and can be operated by cold, wet and gloved hands.</p> <p>Adhesive tapes or plastic envelopes are not used to maintain water-resistant properties.</p> <p>Date of manufacturing and date of expiry indelible printed on the outside.</p>	<p>Markings and identification of ends acceptable</p> <p>Passed _____ Failed _____</p> <p>Time delay if operated from the top _____ sec</p> <p>Operation of specimen when wet, cold and gloved hands.</p> <p>Passed _____ Failed _____</p> <p>Water resistant without the use of envelopes or adhesive tape.</p> <p>Passed _____ Failed _____</p> <p>Hand flare indelible date stamped.</p> <p>Passed _____ Failed _____</p> <p>Comments/Observations</p>

### **3.3 BUOYANT SMOKE SIGNALS**

#### **EVALUATION AND TEST REPORT**

- 3.3.1 Submitted drawings, reports and documents
  - 3.3.1.1 Quality assurance
  - 3.3.1.2 Visual inspection
  - 3.3.1.3 General Data and Specifications
- 3.3.2 Temperature cycling test
- 3.3.3 Low Temperature Conditioning Test
- 3.3.4 High Temperature Conditioning Test
- 3.3.5 Ambient Temperature Conditioning Test
- 3.3.6 Humidity Conditioning Test
- 3.3.7 Water and Corrosion Resistance Test
  - 3.3.7.1 1 meter immersion for 24 hours test
  - 3.3.7.2 100 mm immersion for 5 min test
  - 3.3.7.3 Salt spray Test
- 3.3.8 Handling Safety
  - 3.3.8.1 2 m Drop Test
  - 3.3.8.2 Immersion suit glove test
- 3.3.9 Heptane Test
- 3.3.10 Laboratory Smoke Obscuration Test
- 3.3.11 Wave Test
- 3.3.12 Liferaft Drop Test
- 3.3.13 Safety Inspection

**3.3 BUOYANT SMOKE SIGNALS**  
**EVALUATION AND TEST REPORT**

<b>Manufacturer</b>	
<b>Type/Model</b>	
<b>Date of Approval</b>	
<b>Place</b>	
<b>Name Surveyor printed</b>	
<b>Signature</b>	
<b>Approving Organisation</b>	



<b>Buoyant Smoke Signals</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

**3.3.1 Submitted drawings, reports and documents**

Submitted drawings and documents			Status
Drawing No.	Revision No. & date	Title of drawing	

Submitted reports and documents			Status
Report/Document No.	Revision No. & Date	Title of report / document	
		Maintenance Manual -	
		Operations Manual -	

<b>Buoyant Smoke Signals</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.3.1.1 <b>Quality Assurance</b>	<b>Regulations: -</b>
<p>Except where all appliances of a particular type are required by Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended, to be inspected, representatives of the Administration should make random inspections of manufacturers to ensure that the quality of life-saving appliances and materials used comply with the specification of the approved prototype life-saving appliance.</p> <p>Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are provided to the same standard as the prototype life-saving appliance approved by the Administration and to keep records of any production tests carried out in accordance with the Administration's instructions.</p>	<p>Quality Assurance</p> <p>Standard Used: -</p> <p>Quality Assurance Procedure: -</p> <p>Quality Assurance Manual: -</p> <p>Description of System.</p> <p>Quality Assurance System acceptable Yes/No</p> <p>Comments/Observations</p>

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.1.2 Visual inspection		Regulations: LSA Code I/1.2.2	
Test Procedure	Acceptance Criteria	Significant Test Data	
Visual examination:-	Buoyant Smoke Signals should:-		
Approval markings	be clearly marked with approval information including the Administration which approved it, date of manufacture and expiry and operational restrictions, markings are to be indelible;	Passed _____	Failed _____
Operating instructions.	be provided with brief instructions or diagrams clearly illustrating the use of the buoyant smoke signal printed on the casing;	Passed _____	Failed _____
Outer casing.	not depend on adhesive tapes or plastic envelopes for its water-resistant properties	Passed _____	Failed _____
Comfort.	be so designed not to ignite explosively when used in accordance with the manufacturers instructions;	Passed _____	Failed _____
Operation	be so constructed that the end from which the smoke is emitted can be positively identified by day or night, it should not emit flame during the entire emission time or be swamped in a seaway;	Passed _____	Failed _____
Ignition System.	be fitted with an integral means of ignition;	Passed _____	Failed _____
Life of Smoke Signal	The administration should determine the period of acceptability of the unit which are subject to deterioration with age.	Passed _____	Failed _____
		Comments/Observations	

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

TEST ITEMS CONDITIONING SEQUENCE	SPECIMEN NUMBER										REFERENCES	REMARKS
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	MSC81(70)		
Measuring dimensions and mass	A	A	A	A	A	A	A	A	A			
Temperature cycling test (3.3.2)	B	B	B							4.8.1		
Low temperature conditioning (3.3.3)	C									4.8.1		
High temperature conditioning (3.3.4)		C								4.8.1		
Ambient temperature conditioning. (3.3.5)			C							4.8.1		
Humidity conditioning (3.3.6)				C						4.2.4		
1 meter immersion for 24 hours (3.2.7.1)					C					4.3.1		
100 mm for 5 minutes (3.2.7.2)						C				4.3.2		
Salt water spray (3.2.7.3)							C			4.3.3		
2 m Drop Test (3.3.8.1)								C		4.4.1		
Safety inspection (3.3.13)	D	D	D	D	D	D	D	D		4.5		

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____	
	Model: _____	Surveyor: _____		
	Lot/Serial Number: _____	Organization: _____		

Specimen No. ->	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-26	References	Remarks
Operation at ambient temperature			E		E	E	E	E		4.3.1, 4.3.2, 4.3.3 & 4.4.1, 4.8.1	
Operate at conditioning Temperature	E	E		E						4.2.4 4.8.1	
Operational test using immersion suit glove (3.3.8.2)							F			4.4.2	
Heptane test (3.3.9)								F		4.8.2	
Smoke material test Smoke obscuration (3.3.10)										4.8.3	Additional smoke signals may be submitted to an independent laboratory acceptable to the Administration and report submitted.
Wave height test (3.3.11)				G						4.8.4	
Smoke emission time 3 minutes minimum, Smoke colour	H	H	H	H	H	H	H	H		4.8.1	
Liferaft Drop Test (3.3.12) & (4.2.4)									I	LSA Code Chapter IV Para 4.1.1.2	The liferaft manufacturer should complete this form

Note: The letters in the above `boxes' refer to the sequence of testing of each specimen Buoyant Smoke Signal.

<b>Buoyant Smoke Signals</b>	Manufacturer: _____ Date: _____ Time: _____
	Model: _____ Surveyor: _____
	Lot/Serial Number: _____ Organization: _____

3.3.2      Temperature cycling test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/1.2.1 & 4.8.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
The 9 specimens of smoke signals should be alternately subjected to surrounding temperatures of -30C and +65C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:  1.      an 8 h cycle at +65C to be completed in one day; and  2.      the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;  3.      an 8 h cycle at -30C to be completed the next day; and  4.      the specimen removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.	After 10 alternating cycles each specimen should no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.	1	2	3
		Condition (Pass/Fail)		
		4	5	6
		Condition (Pass/Fail)		
		7	8	9
		Condition (Pass/Fail)		
		Comments/Observations		
		Passed _____      Failed _____		

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____	
	Model: _____	Surveyor: _____		
	Lot/Serial Number: _____	Organization: _____		

3.3.3Low temperature conditioning test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.8.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three smoke signals that have undergone temperature cycling should be taken from a stowage temperature of -30 <sup>0</sup> C, be activated and operate in seawater at a temperature of -1 <sup>0</sup> C.	After conditioning each specimen should no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.  The 3 specimens of smoke signals should function effectively, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water.  The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturer's instructions, nor emit any flame during the entire smoke emission time. The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	1	2	3
		Condition (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke colour (Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission quality (Continuous/Intermittent)		
		Comments/Observations		
Passed _____ Failed _____				

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

3.3.4High temperature conditioning test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.8.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three smoke signals that have undergone temperature cycling should be taken from a stowage temperature of +65°C, be activated and operate in seawater at a temperature of +30°C.	After conditioning each specimen should no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.  The 3 specimens of smoke signals function effectively, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water.  The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturers instructions, not emit any flame during the entire smoke emission time.  The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	4	5	6
		Condition (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke colour (Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission quality (Continuous/Intermittent)		
		Comments/Observations		
Passed _____ Failed _____				



<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.5Ambient temperature conditioning test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.8.1		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three smoke signals that have undergone temperature cycling should be taken from ordinary room conditions and activated. After emitting smoke for 1 minute they should be fully submerged for a period of not less than 10 seconds.	After conditioning each specimen should no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.  The 3 specimens of smoke signals should function effectively, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water.  The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturers instructions, not emit any flame during the entire smoke emission time. The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	7	8	9
		Condition (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke colour (Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission during submerge test (Pass/Fail)		
		Comments/Observations		
		Passed _____Failed _____		

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.6 Humidity conditioning test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.2.4		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of smoke signals should be subjected to a temperature of +65°C and 90% relative humidity for at least 96h, followed by ten days at 20°C to 25°C at 65% relative humidity.	After conditioning each specimen should no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.  The 3 specimens should function effectively, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water..  The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturers instructions, not emit any flame during the entire smoke emission time.  The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	10	11	12
		Condition (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke colour(Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission quality (continuous/intermittent)		
		Comments/Observations		
		Passed _____ Failed _____		



<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____		Organization: _____

3.3.7.2100 mm immersion for 5 min test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.3.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of smoke signals should be immersed in the ready to fire condition for 5 minutes under 10 cm of water and than subjected to the function test at ambient temperature.	After conditioning each specimen should no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical properties.  The three specimens should function correctly, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water.  The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturers instructions, not emit any flame during the entire smoke emission time.  The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	16	17	18
		Condition (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke colour (Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission (continuous/Intermittent)		
		Comments/Observations		
Passed _____ Failed _____				



<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.8.1      2 m Drop Test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.4.1			
Test Procedure	Acceptance Criteria		Significant Test Data		
<p>Three specimens of buoyant smoke signal should be dropped in turn end-on and horizontally from a height of 2 m on to a steel plate about 6mm thick cemented on to a concrete floor.</p> <p>The three specimens should remain in a safe condition after the 2 m Drop Test and should function effectively.</p>	<p>The three specimens should function correctly, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water</p> <p>The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturer's instructions, nor emit any flame during the entire smoke emission time.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>		22	23	24
			Condition (Pass/Fail)		
			Smoke emission time (min/sec)		
			Smoke colour (Pass/Fail)		
			Time delay (if applicable) (sec)		
			Smoke emission (Continuous/Intermittent)		
Comments/Observations					
<p>Passed _____ Failed _____</p>					

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.8.2Immersion suit glove test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.4.2		
Test Procedure	Acceptance Criteria	Significant Test Data		
Three specimens of buoyant smoke signals should be activated in accordance with the manufacturer's operating instructions by an operator wearing an insulated buoyant immersion suit or the gloves taken from an insulated buoyant suit.	The three specimens should be capable of being operated effectively without injury to the operator, or any person in close proximity, during firing or burning.  The three specimens should function correctly, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water  The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturer's instructions, nor emit any flame during the entire smoke emission time.  The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *  *Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.	19	20	21
		Condition (Pass/Fail)		
		Glove operation (Pass/Fail)		
		Smoke emission time (min/sec)		
		Smoke colour (Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission (Continuous/Intermittent)		
Comments/Observations				
Passed _____Failed _____				

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.9	Heptane test	Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.8.2				
Test Procedure		Acceptance Criteria		Significant Test Data		
<p>Three smoke signals should function in water covered by 2 mm layer of heptane.</p> <p>The test should be conducted at a water temperature of +20<sup>0</sup>C to +25<sup>0</sup>C. The smoke signal should be allowed to burn completely.</p>		<p>The three specimens should not ignite the heptane, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes when floating in calm water</p> <p>The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturer's instructions, nor emit any flame during the entire smoke emission time.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>		<div>22</div> <div>23</div> <div>24</div>		
				Heptane ignition (Pass/Fail)		
				Smoke emission time (min/sec)		
				Smoke colour (Pass/Fail)		
				Time delay (if applicable) (sec)		
				Smoke emission (continuous/Intermittent)		
				Comments/Observations		
Passed _____ Failed _____						



<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.10 Laboratory smoke obscuration test		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.8.3
Test Procedure	Acceptance Criteria	Significant Test Data
<p>Three additional specimens from the same lot should be used.</p> <p>Laboratory testing of the smoke signal should establish that at least 70% obscuration throughout the minimum emission time is attained when the smoke is drawn through a 19 cm diameter duct by a fan capable of producing an entrance air flow of 18.4 m³/min.</p>	<p>The testing laboratory report should confirm that at least 70% obscuration rate throughout the minimum emission time of 3 min is maintained.</p>	<p>Laboratory Testing Report No.</p> <p>Report acceptable (Yes/No)</p> <p>Smoke obscuration rate achieved at −30<sup>0</sup>C _____ %</p> <p>Burning time of smoke signal _____ sec</p> <p>Smoke obscuration rate achieved at +20<sup>0</sup>C _____ %</p> <p>Burning time of smoke signal _____ sec</p> <p>Smoke obscuration rate achieved at +65<sup>0</sup>C _____ %</p> <p>Burning time of smoke signal _____ sec</p> <p>Comments/Observations</p> <p>Passed _____ Failed _____</p>

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.11 Wave test	Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.8.4			
Test Procedure	Acceptance Criteria	Significant Test Data		
<p>A smoke signal should be tested in waves at least 300 mm high and should be allowed to burn completely.</p>	<p>The three specimens should function correctly, they should emit smoke of a highly visible colour at a uniform rate for a period of not less than 3 minutes.</p> <p>The buoyant smoke signal should not ignite explosively when used in accordance with the manufacturer's instructions, nor emit any flame during the entire smoke emission time.</p> <p>The colour of the smoke should be orange as defined by sections 34, 48, 49 or 50 of the publication Colour: Universal Language and Dictionary of Names. *</p> <p>*Special Publication 440, National Bureau of Standards, Washington, DC 20402, USA.</p>	10	11	12
		Smoke emission time (min/sec)		
		Smoke colour (Pass/Fail)		
		Time delay (if applicable) (sec)		
		Smoke emission (continuous/Intermittent)		
<p>Comments/Observations</p> <p>Passed _____ Failed _____</p>				

<b>Buoyant Smoke Signals</b>	Manufacturer: _____	Date: _____	Time: _____
	Model: _____	Surveyor: _____	
	Lot/Serial Number: _____	Organization: _____	

3.3.12Liferaft drop test		Regulations: LSA Code 1.2 & 4.1.1.2			
Test Procedure	Acceptance Criteria	Significant Test Data			
The liferaft in the operationally packed condition should be suspended and then dropped from a height of 18 m into the water. If the liferaft is to be stowed at a height greater than 18 m above the waterline in the lightest seagoing condition, it should be dropped from the height at which it is to be stowed.   					

<b>Buoyant Smoke Signals</b>	Manufacturer:_____	Date:_____	Time:_____
	Model:_____	Surveyor:_____	
	Lot/Serial Number:_____	Organization:_____	

3.3.13 Safety Inspection		Regulations: LSA Code I/1.2 & III/3.3; MSC.81(70) 1/4.5
Test Procedure	Acceptance Criteria	Significant Test Data
It should be established by visual inspection that the buoyant smoke signal: -		
1. is indelibly marked with clear and precise instructions on how it should be operated and that the danger end can be identified by day or night;	Clear and precise operating instructions are marked on the buoyant smoke signal and the buoyant smoke signal clearly identifies the danger end.	Markings and identification of ends acceptable Passed _____ Failed _____
2. can, if hand operated, be operated from the bottom (safe end) or that it contains an operational safety delay of 2 seconds;	It operated from the top the time delay is not to be less than 2 s.	Time delay if operated from the top _____ sec
3. has a simple and integral means of ignition which requires the minimum of preparation and can be readily operated in adverse conditions without external aid and with wet, cold or gloved hands;	It has a simple means of ignition and can be operated by cold, wet and gloved hands.	Operation of specimen when wet, cold and gloved hands. Passed _____ Failed _____
4. does not depend on adhesive tapes or plastic envelopes for its water resistant properties; and	Adhesive tapes or plastic envelopes are not used to maintain water-resistant properties.	Water resistant without the use of envelopes or adhesive tape. Passed _____ Failed _____
5. can be indelibly marked with means of determining its age.	Date of manufacturing and date of expiry indelible printed on the outside.	Buoyant smoke signal indelible date stamped. Passed _____ Failed _____
		Comments/Observations